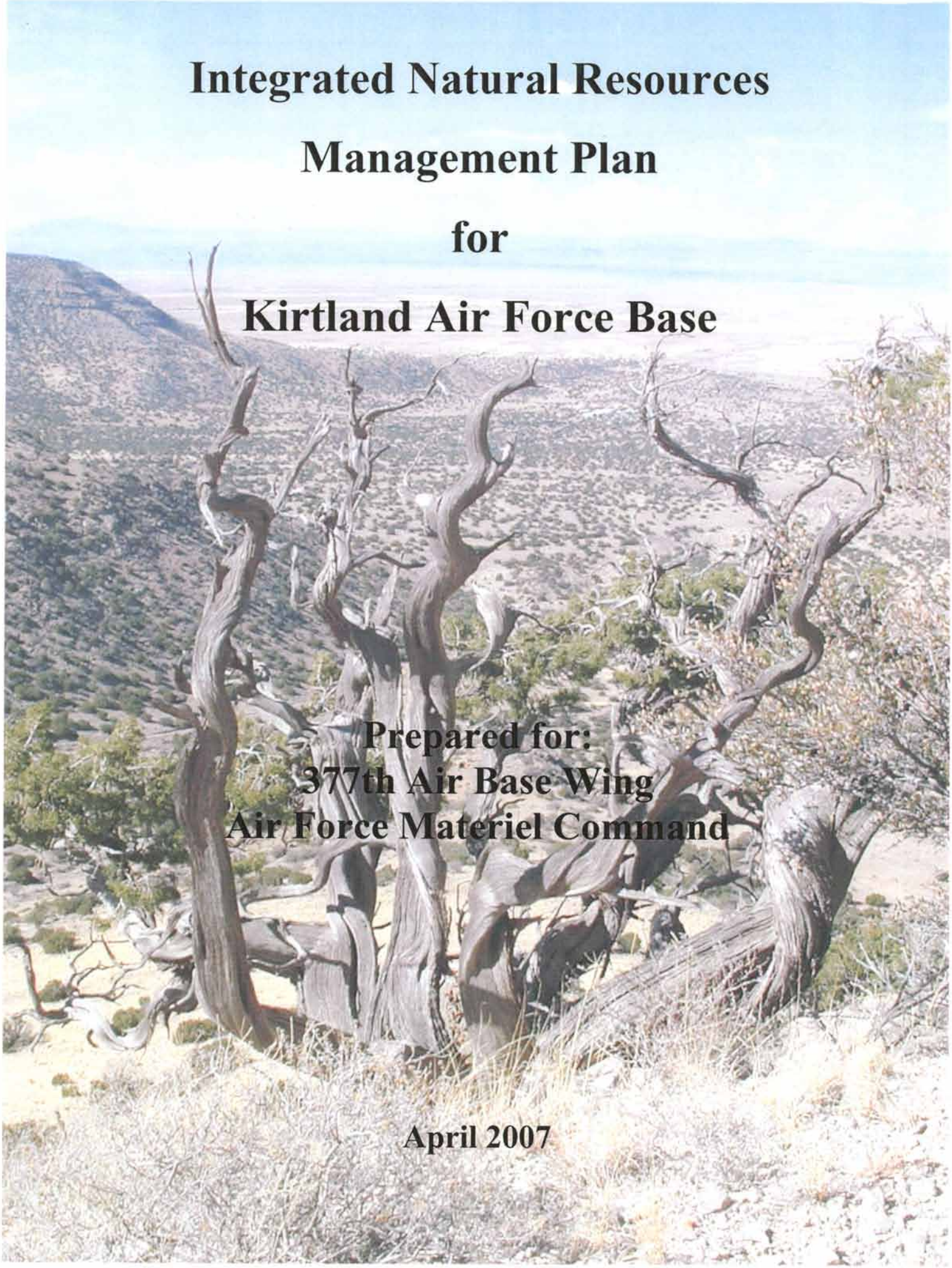
Integrated Natural Resources Management Plan for Kirtland Air Force Base



Prepared for:
377th Air Base Wing
Air Force Materiel Command

April 2007

UNITED STATES AIR FORCE
Kirtland Air Force Base
377 CES/CEVQ
2050 Wyoming Blvd., SE, Suite 118
Kirtland AFB, NM 87117-5270

Agency Concurrence Letter

This Integrated Natural Resources Management Plan (INRMP), in effect from October 2006 to October 2011, has been prepared in accordance with applicable regulations, standards and procedures of the Department of Defense and the United States (U.S.) Air Force in cooperation with the U.S. Fish and Wildlife Service, New Mexico Department of Game and Fish (NMDG&F), and U.S. Forest Service. The signatures below indicate the mutual agreement of these parties concerning the conservation, protection, and management of fish and wildlife resources presented in the plan.

ROBERT E. SUMINSBY, JR., Colonel, USAF — Date
Commander

Benjamin N. Tiggle, Ph.D — Date
Acting Regional Director
U.S. Fish and Wildlife Service

Regional Forester, Southwestern Region — Date
Harv Forsgren

As signatory to this INRMP, the NMDG&F acknowledges concurrence, as statutorily authorized by Chapter 17 of the New Mexico Statutes Annotated, with the wildlife management portions of the INRMP.

Mr. Bruce Thompson — Date
Director
New Mexico Dept. of Game and Fish

ANNUAL REVIEW AND COORDINATION

Kirtland Air Force Base (AFB) will establish and maintain regular communications with the appropriate federal, state, and installation organizations to address issues concerning implementation of this Integrated Natural Resources Management Plan (INRMP). At a minimum, this includes an annual review of the INRMP by Kirtland AFB representatives in coordination with the U.S. Fish and Wildlife Services (USFWS), the New Mexico Department of Game and Fish (NMDG&F) and the Cibola National Forest (CNF). This annual review verifies that:

- All "must fund" projects and activities that have been budgeted for implementation are on schedule,
- All required trained natural resources positions are filled or are in the process of being filled,
- Projects and activities for the upcoming year have been identified and included in the INRMP,
- All required coordination with the USFWS, NMDG&F and CNF has occurred, and
- Any significant changes to the installation's mission requirements or its natural resources have been identified.

2007 Review _____

ROBERT E. SUMINSBY, JR. Date
Colonel, USAF
Wing Commander
377th Air Base Wing

PRELIMINARY FINAL
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
AT
KIRTLAND AIR FORCE BASE

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ACRONYMS AND ABBREVIATIONS

ABW	Air Base Wing
AFB	Air Force Base
AFI	Air Force Instruction
AFIA	Air Force Inspection Agency
AFMC	Air Force Materiel Command
AFNWCA	Air Force Nuclear Weapons and Counter Proliferation Agency
AFPD	Air Force Policy Directive
AFRL	Air Force Research Laboratory
AICUZ	Air Installation Compatible Use Zone
APZ	Accident Potential Zone
AST	aboveground storage tanks
BASH	Bird Aircraft Strike Hazard
BCE	Base Civil Engineer
CATEX	Categorical Exclusion
CAWCO	City of Albuquerque Water Conservation Office
CE	Civil Engineer
CNF	Cibola National Forest
CZ	Clear Zone
DNL	Day-Night Average Sound Level
DOD	Department of Defense
DOE	Department of Energy
DNL	Day-Night Average Sound Level
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESOHC	Environment, Safety, and Occupational Health Council
°F	degrees Fahrenheit
GIS	Geographic Information System
HERTF	High Energy Research and Test Facility
HQ AFSC	Headquarters Air Force Safety Center
INRMP	Integrated Natural Resources Management Plan
IRP/ERP	Installation/Environmental Restoration Program
JP-8	Jet Propulsion Fuel Grade 8
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NMDG&F	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
OSI	Office of Special Investigations
PLO	Public Land Order
RCRA	Resource Conservation and Recovery Act
SNL	Sandia National Laboratories
SOW	Special Operations Wing
T&E	Threatened and Endangered
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USDA	U.S. Department of Agriculture
USC	U.S. Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank

CHAPTER 1
EXECUTIVE SUMMARY

This Integrated Natural Resources Management Plan (INRMP) was developed to provide interdisciplinary strategic guidance for natural resources management on Kirtland Air Force Base (AFB) for a period of five years. The INRMP is a dynamic document that contains information pertinent to every office or agency assigned to Kirtland AFB. The INRMP is integrated with other planning functions, including general planning, comprehensive range planning, cultural resources management planning, Bird Aircraft Strike Hazard (BASH) planning, and pest management planning. Natural resource categories addressed for program management in this INRMP are: geographic information systems (GIS) management, fish and wildlife management, threatened and endangered (T&E) species management, water resource protection, wetland protection, forest management, wildland fire management, integrated pest management, BASH, outdoor recreation, cultural resources protection, enforcement, and public outreach.

Natural resources management, as a result of implementation of this INRMP, will support the military mission. Natural resources managers will implement the principles of multiple use and sustained yield, using scientific methods and an interdisciplinary approach. The conservation of natural resources and the military mission shall not be mutually exclusive. Management of natural resources at Kirtland AFB will result in no net loss of the military mission and operational capability.

This INRMP is focused on the achievement of ten specific goals for the protection and improvement of the natural environment:

Goal 1: Comply with the Sikes Act Improvement Act of 1997, Air Force Instruction (AFI) 32-7064, *Integrated Natural Resources Management*, as revised; Memoranda of Agreement concerning migratory birds and use of United States (U.S.) Geological Survey (USGS) land; and U.S. Air Force (USAF) and U.S. Forest Service (USFS) guidelines for managing natural resources, as well as other environmental rules, regulations, laws and procedures.

Goal 2: Manage and protect natural resources in a manner that results in no net loss of the military mission and operational capability at Kirtland AFB.

Goal 3: Conserve and enhance wildlife habitats to maintain and improve the sustainability and natural diversity of ecosystems on Kirtland AFB.

Goal 4: Identify, conserve, and manage, if present, threatened, endangered, and candidate species listed for regulatory protection by federal and state agencies, in addition to critical habitat and wetlands.

Goal 5: Manage wildlife habitat and populations to reduce the potential for bird and wildlife strikes during flying operations

Goal 6: Increase the awareness, appreciation and conservation of natural resources on Kirtland AFB.

Goal 7: Manage pest in a manner that reduces impacts to natural resources, watersheds, landscapes, and the base mission.

Goal 8: Incorporate existing and future GIS information into a database that supports both mission and project planning and Natural Resources Management Program activities.

Goal 9: Support resource conservation through integrated land and ground maintenance programs and plans, when and where possible.

Goal 10: Provide opportunities for enjoyment and appreciation of the natural resources at the base.

These goals were formulated from a comprehensive analysis of regulatory requirements, the condition of the natural resources on Kirtland AFB, and a consideration of the value of these resources to the people who live and work on the installation. Chapter 8 identifies the specific objectives for each goal, and Appendix A provides the work plans necessary for implementation of these objectives.

Implementation of the INRMP will ensure that Kirtland AFB continues to support present and future mission requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, implementation of this and future revisions of the INRMP will help guide base staff in preserving and improving the sustainability of the ecosystem at Kirtland AFB while supporting military operations.

The National Environmental Policy Act (NEPA) analysis for the plan consists of a environmental assessment (EA) and is included in Appendix B. For the implementation of specific projects or actions included in the plan, the appropriate environmental impact analysis (Environmental Impact Statement [EIS]/Environmental Assessment [EA]/CATEX) will be performed, as required by NEPA.

Additionally, this plan incorporates by reference management direction for Management Area 17 in the Cibola National Forest (CNF) Land and Resource Management Plan (as amended).

CHAPTER 2
GENERAL INFORMATION

2.1 PURPOSE

All major commands of the USAF are directed to develop an INRMP to provide effective management of natural resources. Natural resources include plants, animals, land, water, and air. This plan outlines and assigns responsibilities, identifies concerns, and establishes goals for the management of natural resources for Kirtland AFB and 15,891 acres of CNF land withdrawn from public use for military purposes and known as the "Withdrawal Area." This plan also assists USAF managers in planning, developing, and implementing a program that is designed for the specific requirements of Kirtland AFB. Resources covered include GIS, fish and wildlife, threatened and endangered (T&E) species management, water resource protection, wetland protection, forest management, wildland fire management, integrated pest management, BASH, outdoor recreation, cultural resources protection, enforcement, and public outreach.

The purpose of this INRMP is to provide guidance for the proper management of natural resources on Kirtland AFB while ensuring that military mission requirements are met. The INRMP content and need is driven by AFI 32-7064, *Integrated Natural Resources Management*, and the Sikes Act Improvement Act of 1997, whose focus is to conserve and enhance biodiversity while maximizing natural resources utilization. The goal of the INRMP is to support the USAF mission while providing sound natural resource management practices. This plan addresses the interrelationship between individual resources, mission activities, adjacent land uses and associated public concerns.

2.2 AUTHORITY

The Sikes Act (16 U.S. Code [USC]. 670a-670o), as amended, requires the preparation and implementation of INRMPs on military installations. The Act was amended in 1997 to require that all INRMPs be completed and current by November 2001 with a five-year update cycle. Air Force Policy Directive (AFPD) 32-70, *Environmental Quality* (20 July 1994), and Department of Defense (DOD) Instruction 4715.3, *Environmental Conservation Program* (3 May 1996), state that natural resources at military installations will be managed through effective planning. In AFPD 32-70, the Deputy Undersecretary of Defense (Environmental Security) states "ecosystem management of natural resources draws on a collaboratively developed vision of desired future ecosystem conditions that integrates ecological, economic, and social factors." To effectively integrate ecological, economic, and social factors along with the military mission into an effective ecosystem management program, the policy directive further states: "On DOD installations, ecosystem management will be achieved by developing and implementing the Integrated Natural Resource Management Plan and insuring that it remains current." AFI 32-7064, *Integrated Natural Resources Management* (17 September 2004) implements these directives by establishing the Installation INRMP as the primary planning document for natural resources at Air Force installations. The INRMP assures compliance with statutes, Executive Orders, DOD instructions, and AFPDs as detailed in AFI 32-7064.

Several federal wildlife laws have been enacted to conserve and protect wildlife resources in the U.S. Military installations, including Kirtland AFB are subject to the provision of these laws. The Migratory Bird Treaty Act of 1918 (16 USC 703) affirms the U.S. commitment to conventions with Canada, Mexico, Japan and Russia for protection of shared migratory bird resources. The Act establishes that all migratory birds and their parts (including eggs, nests, and feathers) are fully protected from actions including pursuit, killing, selling, taking, shipping, transporting or exporting. The Bald Eagle Protection Act of 1940 (16 USC 668), as amended, prohibits the take, possession and commerce of bald and golden eagles except under certain specified conditions. Amendments to this Act have led to increased penalties for violations and have strengthened enforcement measures. The Endangered Species Act of 1973 (16 USC 1531-1544), as amended, implemented the Convention on International Trade in Endangered Species of Wild Fauna and Flora (T.I.A.S. 8249), signed by the U.S. on March 3, 1973, and the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (50 Stat. 1354), signed by the U.S. on October 12, 1940. This Act authorized the listing of species as threatened or endangered, sanctioned the acquisition of land and development of cooperative agreements to protect listed species, prohibited unauthorized take, possession, sale and transport of listed species, and instituted civil and criminal penalties for violating the law. Section 7 of the Endangered Species Act establishes that federal agencies must not authorize, fund or carry out actions to jeopardize threatened or endangered species or modify critical habitat.

2.3 RESPONSIBILITIES

The 377th Air Base Wing (ABW) is responsible for ensuring that base assigned and associate units comply with laws and requirements associated with the management of natural resources. The Wing Commander approves the INRMP and any necessary revisions, provides appropriate funding and staffing to ensure implementation of the INRMP, controls access to and use of installation natural resources, and signs cooperative agreements entered into between the installation and other entities pursuant to the Sikes Act.

The Base Civil Engineer (BCE) is responsible for the preparation, maintenance, and day-to-day implementation of the INRMP, and is the focal point for all plan actions and issues. The BCE also establishes mechanisms to review and analyze the impacts using the Environmental Impact Analysis Process for all proposed actions of the INRMP, and makes recommendations based on the analysis to the Environment, Safety, and Occupational Health Council (ESOHC) for approval or disapproval. Members of the ELC ensure that their areas of responsibility are considered in the interdisciplinary approach required to assure proper environmental quality.

Environmental Management at Kirtland AFB prepares, implements, and updates the INRMP. Environmental Management provides technical advice on natural resource matters to the Wing Commander, ESOHC, the BCE, and the Kirtland AFB community planner. In addition, Environmental Management is responsible for budgeting and

advocating for natural resources conservation programs and for developing partnerships with other federal, state, tribal, local, academic and non-governmental organizations.

Commanders of assigned and associate units are required to be familiar with the content of the INRMP and comply with its provisions.

2.4 MANAGEMENT PHILOSOPHY

The guiding principle behind the development of this INRMP is sound ecosystem management for the protection of biological diversity. The comprehensive goal of ecosystem management is to maintain and improve the sustainability and biological diversity of native ecosystems in supporting the Air Force mission and the needs of the military community. Managing ecosystems involves addressing the environment as a complex system of interrelated components rather than a collection of isolated units. Military operations and compliance with federal, state, and local requirements are essential components of the Kirtland AFB mission. Successful ecosystem management requires Air Force environmental managers to consider factors such as the military mission, state and federal laws, community values, socioeconomics, and adjacent land uses in addition to the biological environment. Management of natural resources on Kirtland AFB will result in no net loss of the military mission or operational capability.

In order to provide for effective ecosystems management as an integral part of the Base General Plan, all installations that encompasses land and water suitable for the conservation and management of natural resources are directed to develop an INRMP. The INRMP is a natural resources management plan based on ecosystem management showing the interrelationships of the installation plans as well as mission and land use activities affecting the basic land management plans (AFI 32-7064). This plan outlines and assigns responsibilities, identified concerns, and establishes standard operating procedures for the management of natural resources on an installation.

The INRMP assists managers in the planning, development, and implementation of a program tailored to the requirements of specific facilities and land holdings. The INRMP will be integrated and coordinated with the Base General Plan, the Pest Management Plan, the BASH Plan, the Air Installation Compatible Use Zone (AICUZ), the Cultural Resources Management Plan, and other planning documents to assure that mission activities are conducted consonant with sound ecosystem management for the protection of biological diversity.

2.5 CONDITIONS FOR IMPLEMENTATION AND REVISION

According to AFI 32-7064, INRMPs are to be "living documents" incorporating all aspects of natural resources management and ensuring that they are compatible with each other and with the Kirtland AFB mission. This INRMP will be reviewed annually and updated as needed to maximize its usefulness to base natural resource personnel. Final approval authority for the INRMP at Kirtland AFB rests with the Wing Commander. When planning projects or mission changes, Kirtland AFB must consider the goals and

objectives of this INRMP. This INRMP has been approved by the Wing Commander, BCE, Kirtland AFB's Natural Resources Manager, Headquarters Air Force Materiel Command (AFMC), and reviewd by 377 MSG/CEVC, 377 MSG/CEVR, and 377 MSG/CEVQ. This INRMP will be effective for five years after the last required signature has been endorsed. Annually, this INRMP will be reviewed to determine if any revisions are required. Mission realignment, transfer of lands, and land acquisition are examples of actions that would require updates or revisions.

2.6 ENVIRONMENTAL DOCUMENTATION

The NEPA analysis for the plan resulted in a EA included in Appendix B. For the implementation of specific projects or actions included in the plan, the appropriate environmental impact analysis will be performed, as required by NEPA and 32 CFR 989, Environmental Impact Analysis Process.

CHAPTER 3
INSTALLATION OVERVIEW

3.1 LOCATION AND AREA

Kirtland AFB is located just southeast of Albuquerque, New Mexico, at the foot of the west side of the Manzanita Mountains (Figure 3-1). These mountains rise to over 10,000 feet and define the eastern boundary of an area locally known as East Mesa. Kirtland AFB encompasses more than 52,000 acres of the East Mesa with elevations ranging from 5,200 to almost 8,000 feet above mean sea level (USGS 1990a, b, c; 1991a, b, c). Land uses adjacent to the base include the CNF to the northeast and east, the Isleta Reservation to the south, and residential and business areas of the City of Albuquerque to the west and north.

The airfield complex serving Kirtland AFB is shared with the Albuquerque International Sunport, located adjacent to the northwest corner of the base. Airfield operations and aircraft support facilities are concentrated in the airfield complex area. The remaining intensive development at the base (e.g., administrative, housing, medical, and commercial services) is located east of the airfield complex, also in the northwest corner of the base. The base golf course and landfill are located southeast of the developed area. The remaining areas of the base (approximately 80 percent of the base land area) are largely dedicated to military training and operational facilities. Sandia National Laboratories also operates and maintains several facilities on base for research, testing and evaluation of various weapons, communication and energy systems.

3.2 INSTALLATION HISTORY

In late 1939, the U.S. Army leased 2,000 acres from the City of Albuquerque adjacent to the Municipal Airport. A small number of aviation mechanics used this property to service and repair Army aircraft being flown across the country. In January 1941, the Army decided to establish a permanent presence in Albuquerque and construction began on the Albuquerque Army Air Base. Designers planned the initial project to house and supply quarters and workspace for the 225 officers and 1,970 enlisted men of the 19th Bombardment Group, as well as the associated squadron, quartermaster, signal, ordnance, medical, chemical warfare, chapel, and finance units. In February 1942, Albuquerque Army Air Base was renamed Kirtland Field, in honor of Colonel Roy Carrington Kirtland (1874-1941) (USAF 2000).

As the U.S. entered World War II, the Army Air Force had a need to increase its training schools. Kirtland Field was expanded by the addition of 1,100 acres to the east of the existing base boundary, an area that included the adjacent Oxnard Field. On May 12, 1942, transfer of Oxnard Field to the Army Air Force was completed. Renamed the Albuquerque Air Depot Training Station, and unofficially referred to as Sandia Base, the field became a facility of the Air Service Command of the U.S. Army Air Force. The primary mission of the new base was the training of military personal in aircraft service, repair, and maintenance (USAF 2000).

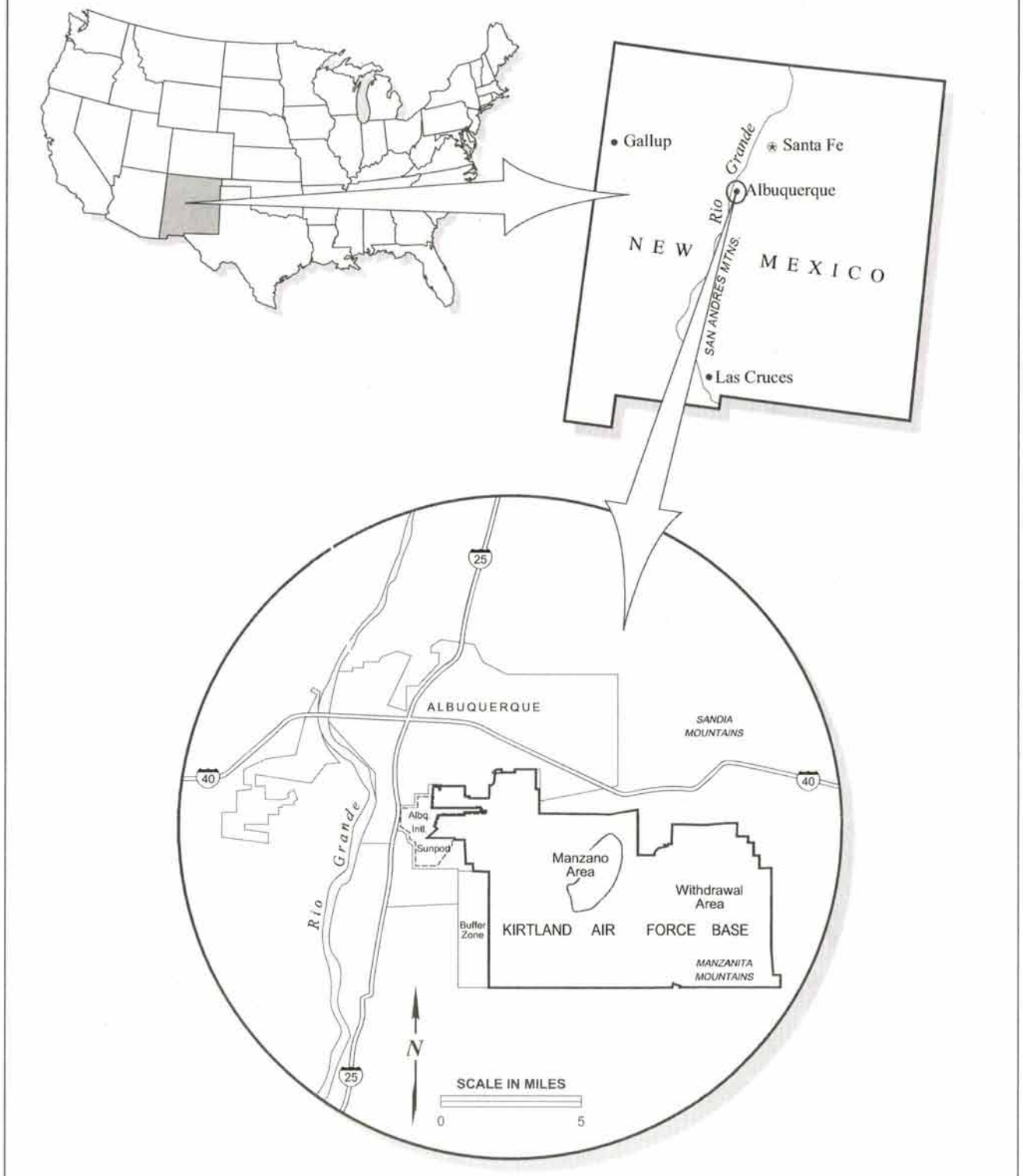

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FIGURE

INRMP

Kirtland Air Force Base Location

3-1

In 1943, the Army reached the saturation point for personnel trained in the above disciplines and a period of relative inactivity followed on the base. During this time, many of the base buildings were abandoned and training equipment was moved to storage. In 1944 and 1945, the base was used as a convalescent center for wounded aviators (USAF 2000).

In 1945, Sandia Base came under the control of the Manhattan Engineer District (named after the Manhattan Project at Los Alamos) of the U.S. Army Corps of Engineers (USACE). Separation of the military functions at Sandia Base from the functions of Los Alamos Laboratory was desirable by mid-1946. Around that time, Sandia Base became an ordnance activity, used for the development of high explosives, that included two areas (technical areas 1 and 2) administered by the Department of the Army. U.S. Army Colonel Gilbert M. Dorland became the first Commanding Officer of Sandia Base on July 29, 1946. On January 1, 1947, the Atomic Energy Commission activated the USAF Special Weapons Project. A portion of the Los Alamos staff, called the "Z Division" after its leader Dr. Jerrold Zacharias, was the forerunner of the Sandia National Laboratories. On April 1, 1948, the Z Division became the Sandia Branch of the Los Alamos Scientific Laboratory. On November 1, 1949, Sandia Corporation, a wholly owned subsidiary of Western Electric, assumed the management of Sandia National Laboratories. On July 1, 1971, both Sandia Base and the adjacent nuclear weapons storage facility, Manzano Base, were incorporated into Kirtland AFB. Many other organizational changes occurred from 1974 to 1992. In June 1992, Kirtland AFB became an AFMC Base and has been operated by the 377 ABW since that time.

The 1985 CNF Land and Resource Management Plan, as amended in 1987, 1991, and 1996, acknowledged the closure of 20,486 acres of the Sandia Ranger District to public entry for security and safety purposes. Public Land Order (PLO) 133 first withdrew 4,667 acres of National Forest land in 1943 for use in connection with the prosecution of the war. In 1949, PLO 595 withdrew an additional 13,948 acres for experimental purposes to be used by the Department of Navy. In 1954, the Navy determined that it no longer had use for the withdrawn land. PLO's 133 and 595 were turned over to the Department of Army for use with Sandia Base and were reissued as PLO 995. In 1980, a 2,400 acre portion of PLO 995 (encompassing David Canyon) was revoked and returned to public entry. PLO 995 is now with the DOD. In 1969, PLO 4569 withdrew a 4,595 acre tract north of PLO 995 for research and development by the Atomic Energy Commission. PLO 4569 is with the Department of Energy (DOE).

The existing withdrawn lands are established for purposes of tactical training, research, and military developments by both agencies [DOD and DOE] and their contractors. The Cibola National Forest Plan identifies the withdrawn lands as Management Area 17 which specifies that management will remain under the joint control of the USFS, USAF, and DOE. The Forest Service's management emphasis in this area is "…to improve wildlife habitat diversity and decrease the threat of an escaped wildfire from either entity within the intent established Memorandums of Agreement. All public use of the area will be restricted and enforced by personnel of the DOD and DOE."

The impact of Kirtland AFB on the economy of Albuquerque and New Mexico has been substantial. Kirtland AFB continues to play an important role in the economy of the Albuquerque metropolitan area and the base is the largest employer in New Mexico. The goods and services purchased by base employees in the local area create secondary jobs and wages, further adding to the base's total economic importance to the local area. The economic contribution of Kirtland AFB to the Albuquerque area has been estimated to exceed $3.3 billion annually (USAF 2004a).

3.3 MILITARY MISSION

3.3.1. 377th Air Base Wing

The 377 ABW (the Wing), the host organization at Kirtland AFB, was activated under the AFMC on January 1, 1993. The mission of the Wing is to provide world-class munitions maintenance, readiness and training, and base operating support to approximately 76 federal government and 384 private sector tenants and associate units.

Munitions maintenance is the primary mission of the Wing and is provided at the depot level by two squadrons. The squadrons perform in-depth maintenance on Air Force and DOE assets from around the world. Their objective is to deliver all munitions and support to the correct location on time and in prime operating condition.

In addition to munitions maintenance, the 377 ABW provides operating support for over 100 associate units in over 2000 buildings. To support this mission, the 377 ABW has the largest security forces squadron in AFMC. Trained personnel are in constant state of readiness to deploy to any location world wide in support of contingency operations.

The Wing also provides quality and professional support services to the Kirtland AFB community, active duty, retirees, dependents and civilians-with services such as security, medical, housing, fire protection and transportation support.

3.3.2 Tenant Units

The host unit at Kirtland AFB is the 377 ABW, which reports to Headquarters AFMC at Wright-Patterson AFB in Dayton, Ohio. Major groups within 377 ABW include the Maintenance, Mission Support and Medical groups, as well as associate units. Major tenants and organizations represented include those listed below (Kirtland AFB 2006).

3.3.2.1 Space Development and Test Wing

The Space Development and Test Wing (SD&TW) is a 215-person government organization activated on August 1, 2006 that performs development, test and evaluation of Air Force space systems and executes advanced space development and demonstration projects to exploit new concepts and technologies and rapidly migrate capabilities to the warfighter (Kirtland AFB 2006).

3.3.2.2 150th Fighter Wing, New Mexico Air National Guard, encompassing the 188th Fighter Squadron

The New Mexico Air National Guard provides unsurpassed aerospace combat capability and combat support forces to meet any contingency in the world (USAF 2000). Flight training occurs in New Mexico and in various locations within and outside of the U.S. (Air National Guard 1995).

3.3.2.3 58th Special Operations Wing, Air Education and Training Command

The primary mission of the 58th Special Operations Wing (SOW) is to train all USAF helicopter crews and MC-130H, MC-130P, and HC-130 transport crews for worldwide combat rescue and special operations (Kirtland AFB 2006a). This includes identifying facility-related projects to accommodate current and future functions of special operations and rescue training within the Kirtland AFB complex. The training complex covers approximately 40 acres of academic, technical training, and administrative space, as well as 70 acres of ramp space. There are several low-level training routes and remote landing zones in the surrounding area (USAF 2000).

The 58 SOW is also responsible for implementing and maintaining the BASH Plan (Appendix C). This plan establishes procedures to minimize aircraft exposure to the hazards associated with both birds and terrestrial animals in the Kirtland AFB flying area (Kirtland AFB 2002).

3.3.2.4 Air Force Inspection Agency

The Air Force Inspection Agency (AFIA), headquartered at Kirtland AFB, New Mexico, is a Field Operating Agency that reports to the Secretary of the Air Force Inspector General. AFIA is the primary action arm of the Air Force inspection system. The Agency provides independent and timely assessments of acquisition, operations, logistics, support and health care to Air Force Major Commands and Secretary of the Air Force level organizations. AFIA identifies critical deficiencies and recommends improvements for accomplishing peacetime and wartime missions. The Agency evaluates Air Force activities, personnel and policies. In addition, AFIA provides by-law and compliance oversight of all Air Force-level field operating agencies and direct reporting units.

3.3.2.5 Air Force Nuclear Weapons and Counter Proliferation Agency

The vision of the Air Force Nuclear Weapons and Counter Proliferation Agency (AFNWCA) is to design, build and institutionalize the Corporate Air Force Science and Technology Capabilities Flight Plan to operate across the full spectrum of wartime environments and provide the warfighter advanced weapons and technical assessments to counter the full spectrum of conflicts and threats.

Leading a team of scientists, engineers, and program managers, the commander of AFNWCA is responsible for:

- providing the warfighter advanced weapons and technical assessments to counter the full spectrum of conflicts and threats;
- assure the surety and military effectiveness of the Air Force portion of the nuclear weapon stockpile;
- overseeing the Air Force nuclear weapons stockpile stewardship activities;
- serving as the Air Force's programmatic and technical interface to the National Nuclear Security Administration;
- managing all joint DOD/DOE Project Officer Group Air Force nuclear weapons activities;
- coordinating mission requirements and analyses/assessments in the areas of counterforce weaponry, passive/active defense, passive/remote detection, target characterization intelligence, and technical issues associated with treaty compliance;
- providing technical assessments to support warfighting operations and advanced weapons concepts;
- supporting requirements for countering chemical, biological, radiological, nuclear, and explosive weapons of mass destruction; and
- providing career field management services to Air Force scientific and engineering personnel.

3.3.2.6 Air Force Office of Special Investigations, Detachment 116

The mission statement for the Air Force Office of Special Investigations (OSI) is to provide professional special investigative services for the protection of Air Force and DOD people, operations, and materiel worldwide. Command priorities for the Air Force OSI are to exploit counterintelligence activities for force protection, resolve violent crime impacting the Air Force, combat threats to our information systems technologies, and defeat and deter acquisition fraud.

3.3.2.7 Air Force Operational Test and Evaluation Center

The Air Force Operational Test and Evaluation Center's (AFOTEC) mission is to plan and conduct realistic, objective, and impartial operational testing and evaluation to determine the operational effectiveness and suitability of USAF systems and their ability to meet mission needs. Systems are tested under operationally realistic conditions to determine their operational effectiveness in terms of performance, survivability, organization, doctrine, safety, tactics, and threat. Testing is also conducted to determine operational suitability in terms of reliability, maintainability, availability, supportability, compatibility, safety, and realistic environment (Kirtland AFB 2002).

3.3.2.8 Air Force Research Laboratory

The Air Force Research Laboratory (AFRL) mission is to create technologies for the warfighter to control and exploit space. AFRL is headquartered at Wright-Patterson AFB, Ohio, and is responsible for research and technology development in support of the USAF's future and existing aerospace and space weapons systems. Two of the Laboratory's directorates are located at the northwest corner of on Kirtland AFB (Kirtland AFB 2002).

The Directed Energy Directorate develops lasers, imaging, microwaves, and other forms of radiation. It is involved in the development of high-energy plasmas and microwave technologies, electromagnetic pulse hardening, and advanced techniques and computer simulations for weapon effects. This directorate consists of four technical divisions including Starfire Optical Range, Advanced Optics and Imaging, Laser, and High-Power Microwave (Kirtland AFB 2002).

The Space Vehicles Directorate develops spacecraft and ballistic missile technologies, focusing on structures, power and thermal management, sensors, electronics, and geophysics (including effects on systems and operations). The directorate also plans, manages, and conducts space experiments. Three technical divisions form the directorate's core operations, two of which are located at Kirtland AFB.. The Battlespace Environment Division, which detects threats in the aerospace environment to warfighting systems across the full range of natural and man-made sources, is located at Hanscom AFB, Massachusetts. At Kirtland AFB, the Integrated Experiments and Evaluation Division develops, incorporates, and demonstrates vital developing military space concepts. The division also manages and executes a portfolio of space and new space trials, as well as experimental projects such as complex, ground-based, balloon-borne, airborne and orbital missions. Also at Kirtland AFB is the Spacecraft Technology Division, which provides technology to revolutionize space capabilities for global awareness and control of space. In addition, it operates the Centers of Excellence in space-based infrared technologies, as well as in advanced power, structures, and controls research and development (Kirtland AFB 2006).

Potential effects on natural resources include the Starfire Optical Range and the High Energy Research and Test Facility (HERTF) operations, both of which are in the Withdrawal Area within the CNF. These activities entail the use of lasers. The HERTF is located in a canyon, where high-power microwave testing is done. High-power systems explosive testing is conducted at the Chestnut site. Some outdoor laser propagation to targets (south of Building 761 and Hangar 760) also occurs.

3.3.2.9 Headquarters Air Force Safety Center

The mission of the Headquarters Air Force Safety Center (HQ AFSC) is to manage the USAF Mishap Prevention Program and the USAF Nuclear Surety Program. The USAF Safety Agency, a field operating agency, develops regulatory guidance, provides

technical assistance in all safety disciplines, and maintains the USAF database for all safety issues (Kirtland AFB 2002).

HQ AFSC provides state-of-the-art information and communications support. The agency comprises a command section and eight directorates. The command section provides legal, budget, personnel, and administrative support. The agency has four mission directorates: flight safety, ground safety, weapons and space safety, and nuclear surety. The agency also has four support directorates: system safety and engineering, life sciences, safety education, and data operations and analysis (Kirtland AFB 2002).

3.3.2.10 Space and Missile Systems Center, Airborne Laser System Program Office

The mission of the Space and Missile Systems Center is to develop a cost-effective, flexible, airborne high-energy laser system to provide a credible deterrent and lethal defensive capability against boosting theater ballistic missiles.

3.3.2.11 Defense Threat Reduction Agency

The mission of the Defense Threat Reduction Agency is to maintain the accountability database on all nuclear weapons in the national stockpile; to conduct Nuclear Weapons Effects Tests using high explosives; thermal, electromagnetic pulse, and radiation simulation facilities; to conduct Joint Nuclear Surety Inspections of all Armed Services' nuclear capable units; to provide arms control and counter-proliferation support; to provide Cooperative Threat Reduction (Nunn-Lugar) program support; and to operate the Interservice Nuclear Weapons School (Kirtland AFB 2002).

3.3.2.12 Department of Energy

The DOE mission is to maintain a safe, reliable nuclear weapons stockpile; manage nuclear materials awaiting disposition; achieve a restored environment; and to support these goals with a strong science and technology base. The DOE mission is achieved through innovative leadership; safe, environmentally responsible operations; teaming with laboratories and plants; best business practices; results-oriented approaches; responsiveness to customers; and continuous improvements (Kirtland AFB 2002). DOE activities on DOE fee-owned or DOE withdrawn land is not a part of this INRMP.

3.3.2.13 Pararescue and Combat Officer Training School

The Pararescue School supports the combatant commands by training Air Force personnel for deployment into both combat and humanitarian environments to recover personnel and equipment, performance of life-saving medical care, and providing for the security and survival of personnel (Kirtland AFB 2002). All pararescue training on Kirtland AFB is conducted in the central training area. A new training campus is currently proposed for the school that would increase student throughput and decrease required time at the school if constructed.

3.3.2.14 Sandia National Laboratories

As a DOE national laboratory, Sandia National Laboratories (SNL) works in partnership with universities and industry to enhance the security, prosperity, and well-being of the nation. Operated by Lockheed Martin Corporation, SNL provides scientific and engineering solutions to meet national needs in nuclear weapons and related defense systems, energy security, and environmental integrity, and to address emerging national challenges for both government and industry (Kirtland AFB 2002).

3.4 SURROUNDING COMMUNITIES

The region surrounding Kirtland AFB encompasses both urban and rural areas. The City of Albuquerque, with a population of 484,246 people, lies directly north and west of the base. Other surrounding communities are considerably smaller, most being located along the Rio Grande River. Table 3-1 describes these communities and provides the latest population data. The Isleta Indian Pueblo is located directly south of the base, and the two entities share a common border. East of the base is a mixture of National Forest lands and small mountain villages.

Table 3-1. Surrounding Communities

Location	Description	Population (2000 USCB; 2004 USCB)
Albuquerque	Largest municipal jurisdiction adjacent to Kirtland AFB	448,607; 494,236
City of Rio Rancho	Adjacent to northwestern Albuquerque; second largest community regional	51,765; 66,599
Village of Corrales	Located in the Middle Rio Grande Valley north of Albuquerque	7,334; 7,638
Village of Los Ranchos de Albuquerque	Located in the middle Rio Grande Valley about seven miles from downtown Albuquerque; completely within the Albuquerque city limits	5,092; 5,396
*Pueblo of Isleta	Borders Kirtland AFB to the south	3,166
Village of Tijeras	Located east of Kirtland AFB in the Manzano Mountains	474; 499

Source: U.S. Census Bureau (USCB) 2000; USCB 2004
*U.S. Census Bureau 1990

3.5 REGIONAL LAND USE

Kirtland AFB encompasses over 51,000 acres in Bernalillo County and is the third largest base within the AFMC (AFMC 2007). Some of these lands (7,525 acres) are under the jurisdiction of the DOE and will not be included in the following discussions. Lands managed by the USAF are grouped into three categories: improved, semi-improved, and

unimproved grounds (Figures 3-2a and 3-2b). Acreages for these three categories are provided in Table 3-2.

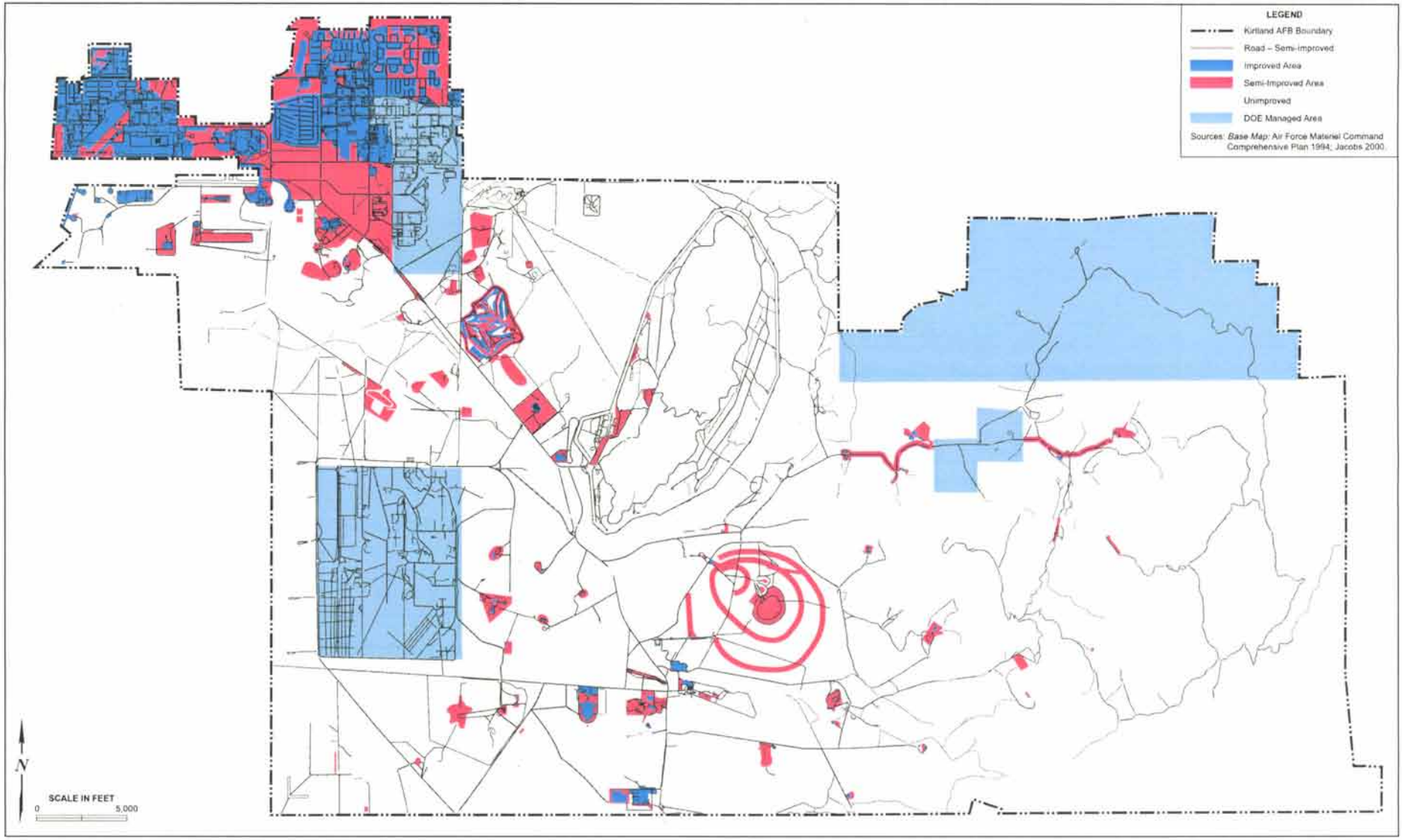
Improved Grounds are those areas where government or contractor personnel perform annual, planned intensive or frequent maintenance activities. These are developed areas such as lawns, golf courses and landscaped plantings requiring continual maintenance. Improved grounds also include impervious surfaces such as buildings, roads, and parking lots, and areas that have been extensively altered, like the active landfill or stormwater catchment basins. The acreage of Kirtland AFB improved grounds is provided in Table 3-2.

Table 3-2. Ground Category Acreage on Lands Maintained by Kirtland Air Force Base*

Area	Category	Size (Acres)	General Description
Kirtland AFB (36,787 acres)	Improved	1,980	Athletic areas, housing areas, commercial and industrial areas; administrative areas, golf course, riding stables, Fam camp, active landfill, stormwater catchment basin
	Semi-improved	2,425	Dirt roads and low maintenance administrative areas, storage areas, heliport, safety zones, training sites and obstacle course, burn pits, road sides, closed landfill cells
	Unimproved	32,382	Areas containing native or naturalized vegetation with no roads or other structures present.
Withdrawal Area (15,891 acres)	Improved	65	Buildings and paved areas
	Semi-improved	305	Areas around buildings, and graded areas such as the M-60 Firing Range and dirt roads
	Unimproved	15,521	Areas containing native or naturalized vegetation with no roads or other structures present.

Source: Memorandum of Understanding between USDA and USAF for total acres on the base and in the Withdrawal Area; areas calculated using a detailed analysis of land maintenance schedules from Jacobs 2000, land use inputs from 377th Civil Engineering Squadron/Civil Engineering Environmental Quality, and 1991 aerial photographs.
* Acreage includes DOE Lands

The majority of improved grounds at Kirtland AFB are located in the developed area in the northwest portion of the base. Most of the buildings on base that support the USAF and associated missions are located here. The developed area also consists of schools, parks, a fire station, the commissary and residential areas that house military personnel. These buildings are supported by a complete utility infrastructure that includes electricity, water, gas, sanitary sewer, and steam. Runways shared with Albuquerque International Sunport are also present in this portion of the base. A golf course is located southeast of the developed area. Improved lands provide little opportunity for natural resources management.



Improved, Semi-Improved and Unimproved Grounds at Kirtland Air Force Base

FIGURE

3-2a

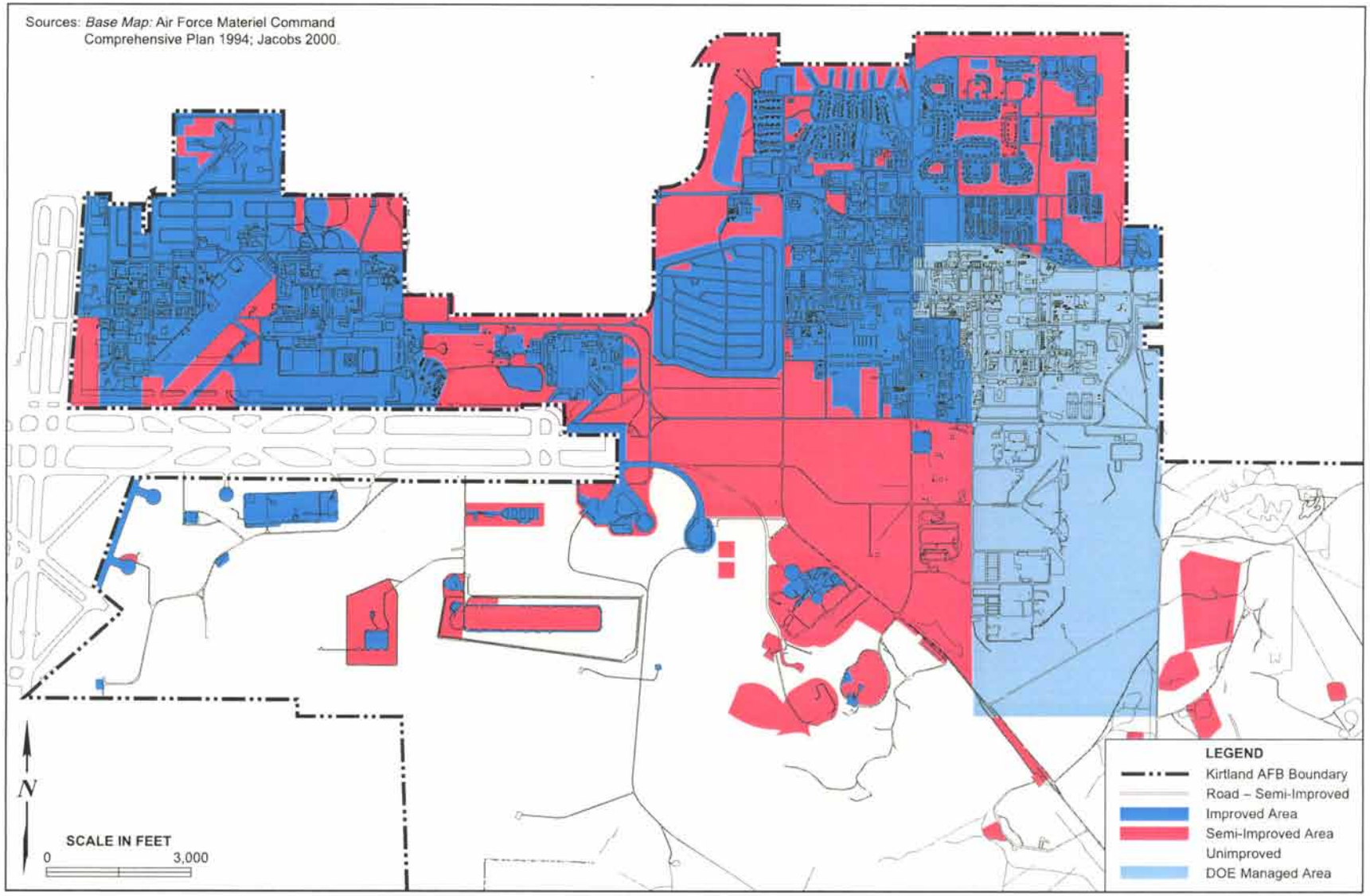


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FIGURE

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Improved, Semi-Improved and Unimproved Grounds at Kirtland Air Force Base

3-2b

Semi-Improved Grounds are grounds where personnel perform periodic maintenance primarily for operational and aesthetic reasons (such as erosion and dust control, weed control, bird control, and visual clear zones). These locations are typically serviced by minimal utilities and dirt roads.

In support of weapons-testing operations and personnel training, some areas on Kirtland AFB are semi-improved. These locations are used as ammunition and explosive storage areas, runway safety zones, training sites, closed landfill cells and the obstacle course. Semi-improved areas, such as the heliport and Coyote Test Range Headquarters, are located in the southern grassland areas of the base. Manzano Base, in the Manzanita Mountains located east of the developed area, has semi-improved areas mostly on the western slope of the mountains. Some natural resources management can be carried out on semi-improved lands

Unimproved Grounds are those areas not classified as improved or semi-improved and usually not requiring maintenance more than once per year, if at all. Unimproved areas are typically managed by Kirtland AFB's Natural Resources Manager or by the USFS.

Unimproved areas of Kirtland AFB can be found in all habitat types outside of the developed area. Most of the unimproved lands on Kirtland AFB are located in the eastern portion of the base within the ponderosa pine and pinyon-juniper habitats of the Withdrawal Area, and in the grasslands in the southern portion of the base. Most of Manzano Base is also unimproved. These locales are not typically serviced by roads or utilities, although some USFS roads are located throughout the Withdrawal Area. Unimproved grounds provide the greatest opportunity for natural resources management.

3.6 LOCAL AND REGIONAL NATURAL AREAS

Kirtland AFB is within the Arizona/New Mexico Plateau and Arizona/New Mexico Mountains Level III Ecoregions of New Mexico as well as the Albuquerque Basin, Conifer Woodlands and Savannas, and Rocky Mountain Conifer Forests Level IV Ecoregions of New Mexico (EPA 2006). The base is located near three regional natural areas: Sandia Mountain Wilderness Area, Sandia Foothills Open Space, and the Rio Grande Valley State Park, also locally known as The Bosque. The Sandia Mountain Wilderness Area is located approximately 5 miles north of the withdrawn portion of the base. This wilderness area, encompassing 37,877 acres, is administered by the Sandia Ranger District and receives an estimated two million person visits a year (USFS 2005). A variety of ecosystems occur in this wilderness area including mountain scrub, montane forest, aspen glades, and spruce/fir forest. The area is home to many species plants and animals such as mule deer, black bears, cougars, and coyotes. It is also located on an important raptor migration route with local groups monitoring annual raptor migrations.

The Sandia Foothills Open Space contains approximately 2,650 acres of steep, sloped hills intersected by gravelly drainages at the base of the Sandia Mountains. This preserve provides local recreational opportunities including hiking, horseback riding, and mountain biking. Trailheads provide access to the Foothills Trails as well as the Sandia

Mountain Wilderness Area, managed by the USFS. Typical vegetation includes cholla, apache plume, three-leaf sumac, various oak species, one seeded juniper, and pinyon pine (City of Albuquerque 1998). Wildlife here is typical of a desert environment with coyotes, lizards, and rattlesnakes regularly encountered.

The Rio Grande Valley State Park was established by the State Legislature in 1983, this park is managed cooperatively by the City of Albuquerque's Open Space Division and the Middle Rio Grande Conservancy District. The 4,300-acre park extends from Sandia Pueblo in the north through Albuquerque and south to Isleta Pueblo. The park preserves a large stand of Rio Grande cottonwood trees that are located along the Rio Grande River. . This deciduous forest ecosystem is unique in an otherwise treeless environment. Other tree species include Russian olive, salt cedar, and various willow species. Besides the river, numerous ponds and drainage ditches provide additional aquatic habitat. Many of the species found here don't occur in the surrounding arid environment. Some of these species include, ducks, geese, herons, kingfishers, grebes, red-winged blackbirds, muskrats, beavers, soft-shelled turtles, painted turtles and various species of fish (City of Albuquerque 1998).

CHAPTER 4
PHYSICAL ENVIRONMENT

4.1 CLIMATE

The climate at Kirtland AFB is characterized by low precipitation; wide temperature extremes; frequent drying winds; and short, but heavy, rains. Average temperatures and precipitation by month for Albuquerque are presented in Table 4-1.

Table 4-1. Average Climate Data for Albuquerque

Month	30-Year Ave. Temp. (°F)	Average Max. Temp. (°F)	Average Min. Temp. (°F)	30-Year Ave. Precipitation (in.)
Jan	36.5	47.0	22.0	0.5
Feb	41.6	53.0	26.0	0.6
Mar	47.9	61.0	32.0	0.6
Apr	56.0	71.0	40.0	0.6
May	65.2	80.0	49.0	0.6
June	75.0	90.0	58.0	0.6
July	78.8	92.0	64.0	1.3
Aug	76.4	89.0	63.0	1.7
Sept	69.6	82.0	55.0	1.1
Oct	57.2	71.0	43.0	0.9
Nov	44.7	57.0	31.0	0.6
Dec	36.6	47.0	23.0	0.4
Year	57.2	70.0	42.2	9.4

Source: National Climatic Data Center 2006, Weather Underground 2006.

The average annual temperature in Albuquerque is 57 degrees Fahrenheit (ºF), with an average daily fluctuation of 28ºF. In summer, high temperatures in the vicinity of Kirtland AFB average 90ºF and low temperatures average 62ºF. During the winter, temperature inversions occur when colder, heavier air stagnates beneath warmer air due to the lack of wind and the presence of the Sandia Mountains, a physical barrier to air flow. Because of these inversions, winter months (December to February) are quite cool, with an average daily low of 38ºF and an average daily high of 58ºF. Sunshine occurs nearly 3,400 hours a year and is evenly distributed in all seasons (U.S. Department of Agriculture [USDA] 1977).

Annual precipitation is variable in the area surrounding Kirtland AFB. West facing slopes generally receive more precipitation than the plateaus between the mountains and the Rio Grande. The average annual precipitation in Bernalillo County ranges from 8 inches in the county's arid valley and mesa areas to 30 inches in the Sandia Mountains east of Albuquerque. Precipitation occurs primarily during the summer months, and more precipitation falls at higher elevations. Half of the average annual precipitation events occur from July to October, during heavy thunderstorms. Annual snowfall averages range from approximately 10 inches in the valley to 3 feet in the foothills. In the higher mountain areas, snowfall averages can reach as high as 10 feet. In the valley, which has an elevation similar to much of Kirtland AFB, the snow season extends from

November to early April, but snow seldom stays on the ground for more than a day (USDA 1977).

Prevailing winds in the area are from the north in the winter and from the south along the river valley in the summer. The average annual wind speed is 9 miles per hour. Gusts up to 50 miles per hour can occur in the vicinity of Tijeras Canyon due to the release of heavy, cold air held back by the Sandia and Manzanita Mountains (USDA 1977). Strong winds occur primarily in late winter and early spring.

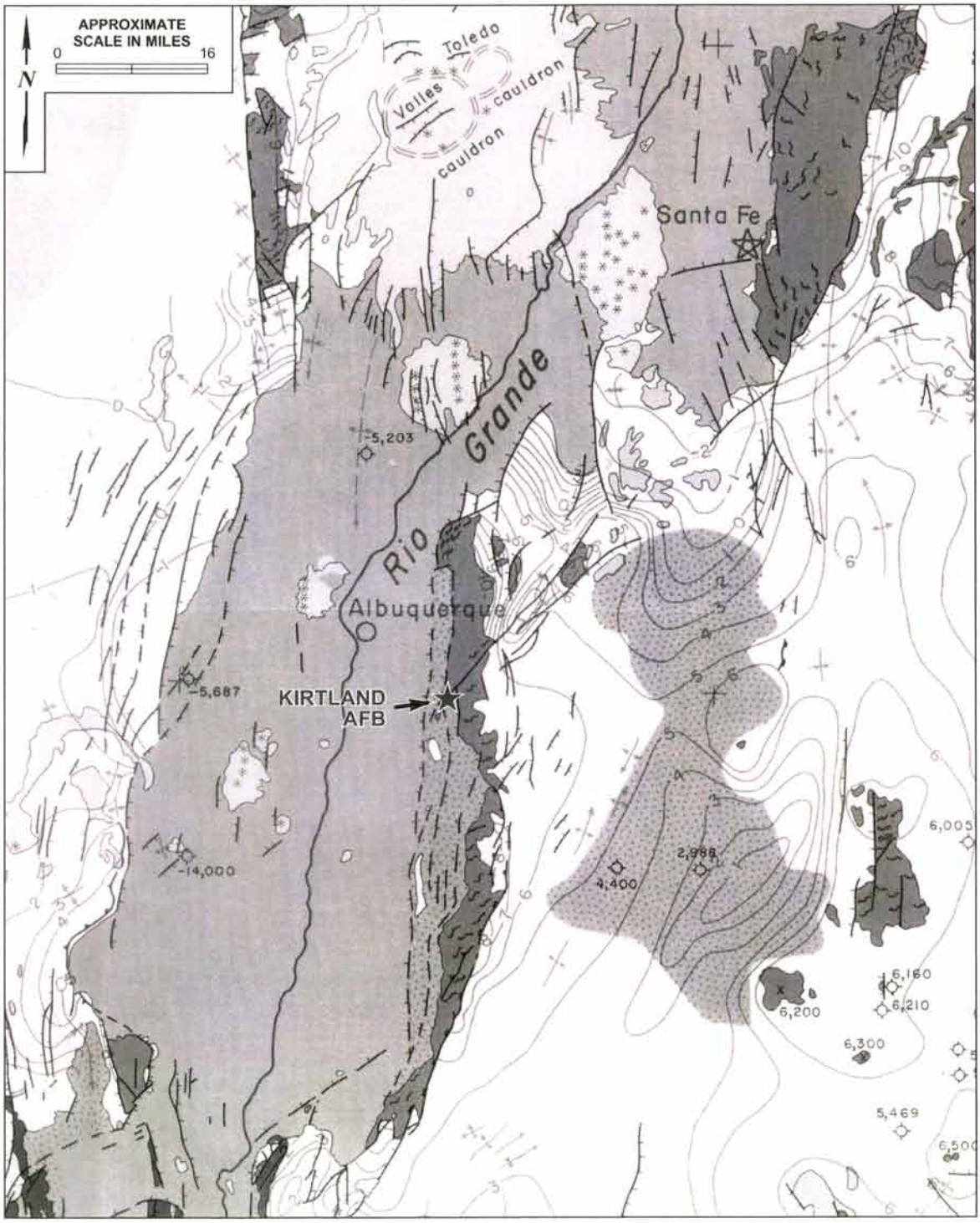
4.2 LANDFORMS

Most of Kirtland AFB is situated on a relatively flat mesa. This mesa is cut by the east-west trending Tijeras Arroyo, which drains into the Rio Grande. Elevations at Kirtland AFB range from 5,200 feet in the west to almost 8,000 feet in the Manzanita Mountains. Kirtlannd AFB is located along the eastern margin of the Albuquerque basin. This basin is a major structural feature of the Rio Grande rift, which is approximately 620 miles long. The Albuquerque basin is one of the largest of a series of northtrending basins and is about 90 miles long and 31 miles wide (NMED 2007). The basin extends from the gently sloping area near the Rio Grande to the steep foothills and slopes of the Sandia and Manzanita Mountains. Several canyons (Lurance, Sol se Mete, Bonito, Otero and Madera) are located in the Withdrawal Area; a few smaller canyons occur on Manzano Base.

4.3 GEOLOGY AND SOILS

The Albuquerque Basin is demarcated to the south by the Socorro Channel, to the north by the Nacimiento Uplift, to the west by the Puerco Plateau and Lucero Uplift, and to the east by the Sandia and Manzanita Mountains. The Albuquerque Basin is at its widest point in the Kirtland AFB area and tapers off at its north and south ends (Figures 4-1a and 4-1b [legend]).

Three major faults traverse Kirtland AFB and converge near Tijeras Arroyo (USAF 1999). Large-scale faulting between 11.2 and 5.3 million years ago deepened the Albuquerque Basin and tilted the local mountains. As a result, basin deposits (including those at Kirtland AFB) are a mixture of volcanic and sedimentary rocks (Energy Research and Development Administration 1977). Different landforms within the basin include mesas, benches, stream terraces, low hills, ridges, and graded alluvial slopes (Lozinsky, et al. 1991, Kelley 1977, Kelley and Northrup 1975).



Source: New Mexico Bureau of Mines and Mineral Resources 1975.

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FIGURE

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Tectonic Map of the Albuquerque/Kirtland Air Force Base Region (Refer to Figure 4-1b for Legend)

4-1a

EXPLANATION

Alluvium, generally thin; may locally include bolson fill that is contemporaneous with Rio Grande rift deposits. Includes comparatively thin late Cenozoic bolson fill in Laramide basins of northern Chihuahua

Generally thick synorogenic sedimentary deposits in Rio Grande rift; Miocene to Holocene

Miocene and younger volcanic rocks (contemporaneous with rifting)

Volcanics of Eocene to early Miocene age

Late Cretaceous and Cenozoic intrusive rocks

Sedimentary rocks of Cambrian to early Miocene age

Precambrian rocks (foliation trends shown)

Structure contour on top of Precambrian; C. I. = 1000 ft; in thousands of feet

Drill hole with elevation of top of Precambrian

est. = estimated top

High-angle fault

Normal fault, hachure on downthrown side

High-angle reverse fault, bar on upthrown side

Thrust fault, barbs on upthrown side

Strike-slip fault

Anticline, showing direction of plunge

Overturned anticline

Syncline showing direction of plunge

Overturned syncline

Synclinal bend showing direction of facing

Overturned synclinal bend

Monocline showing direction of facing

Volcanic center

Cauldron boundary

Source: New Mexico Bureau of Mines and Mineral Resources 1975.

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FIGURE

INRMP

Legend for Tectonic Map of the Albuquerque/Kirtland Air Force Base Region (Refer to Figure 4-1a for Map)

4-1b

Most of the Albuquerque Basin consists of poorly consolidated sediments that eroded from the surrounding mountains following previous faulting and geologic activity. These sediments, known as the Santa Fe Group, are overlain in places by the 5.3 to 1.6-million-year-old Ortiz gravel deposits. In certain places, Rio Grande soil types and volcanic deposits are interspersed. A description of each soil type, its characteristics, and the common native vegetation associated with it is included in Appendix D (USDA 1977).

In the eastern half of the installation, bedrock is exposed in a series of northeast trending geologic structures. This area consists primarily of granite, metamorphic rock, and marine carbonate rocks that are approximately 570 million years old (USAF 1999).

The dominant soils of the Albuquerque Basin, are well drained and loamy, with minor amounts of gravelly and stony soils along the mountains and arroyos. Twenty-six soil types have been identified on Kirtland AFB and in the Withdrawal Area (Figure 4-2).

4.4 HYDROLOGY

Kirtland AFB is located within the Rio Grande watershed (see Figure 4-1a). The Rio Grande is the major surface hydrologic feature in central New Mexico. It flows from north to south through Albuquerque, approximately 5 miles west of Kirtland AFB. The East Mesa, on which Kirtland AFB is located, has a west southwest ground surface slope from about 250 feet per mile near the mountains to 20 feet per mile near the Rio Grande. The mesa's width is variable, ranging from 3 miles across in its northern section to 9 miles across in its southern portion.

East Mesa surface water occurs in the form of stormwater sheet flow that drains into small gullies during heavy precipitation. Tijeras Arroyo, which is dry for most of the year, is the primary surface channel that drains surface water from Kirtland AFB to the Rio Grande (Figure 4-3). Precipitation reaches Tijeras Arroyo through a series of storm drains, flood canals and small, mostly unnamed arroyos. Tijeras Arroyo flows intermittently during heavy thunderstorms and spring snowmelt draining eventually into the Rio Grande River (USACE 1979a, USAF 1991). However, nearly 95 percent of the precipitation that flows through Tijeras Arroyo evaporates before it reaches the Rio Grande River. The remaining 5 percent is equally divided between groundwater recharge and runoff (USAF 1991). Arroyo del Coyote and numerous other smaller arroyos found in the Withdrawal Area represent other watershed features of the area.

There are no natural lakes or rivers on Kirtland AFB or in the Withdrawal Area (USAF 1999). Six man-made ponds are located on Tijeras Golf Course (Fogel 2000). At least 12 naturally occurring springs have been found on the installation, including four in the Withdrawal Area (USACE 1995).

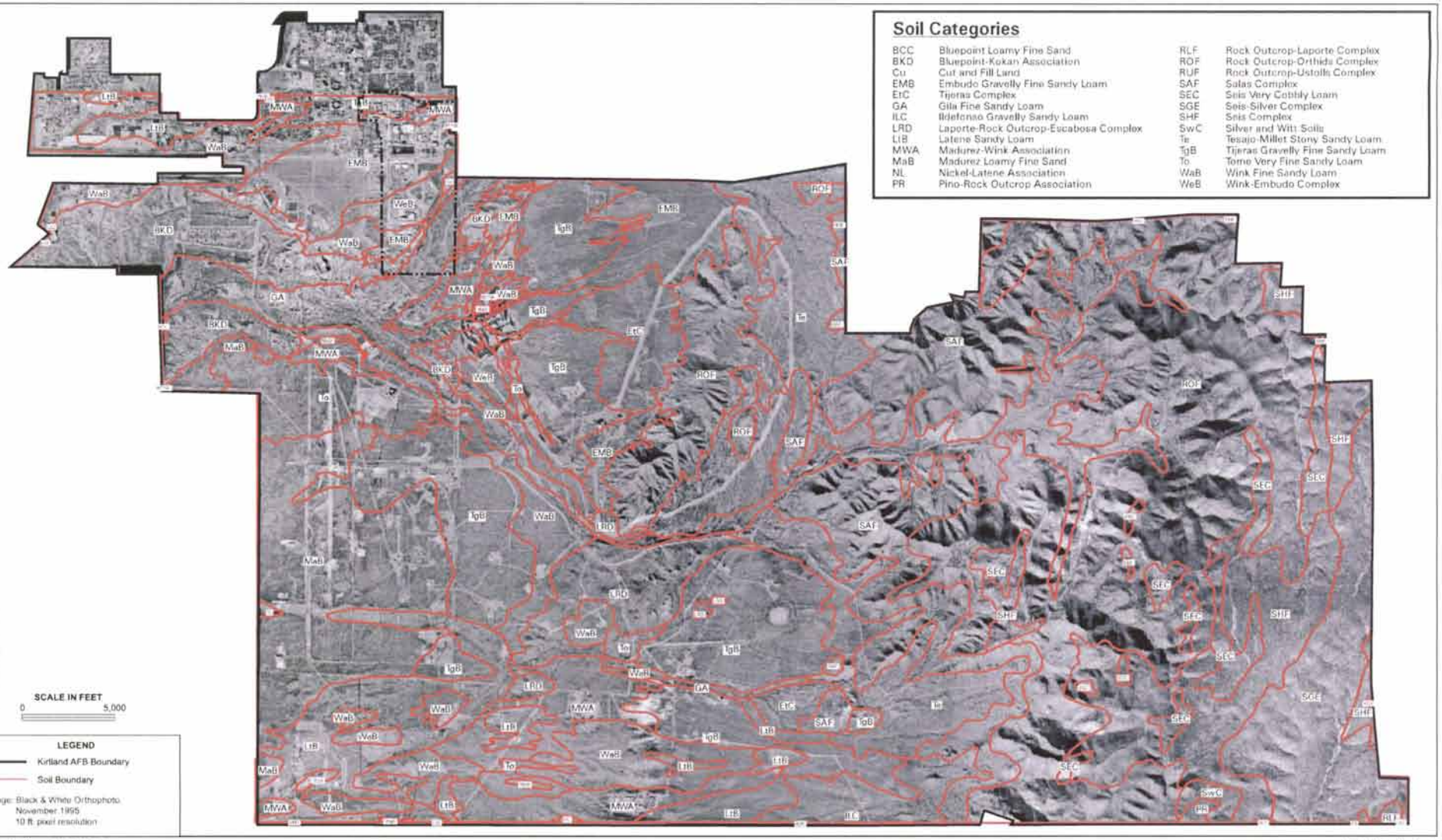

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FIGURE

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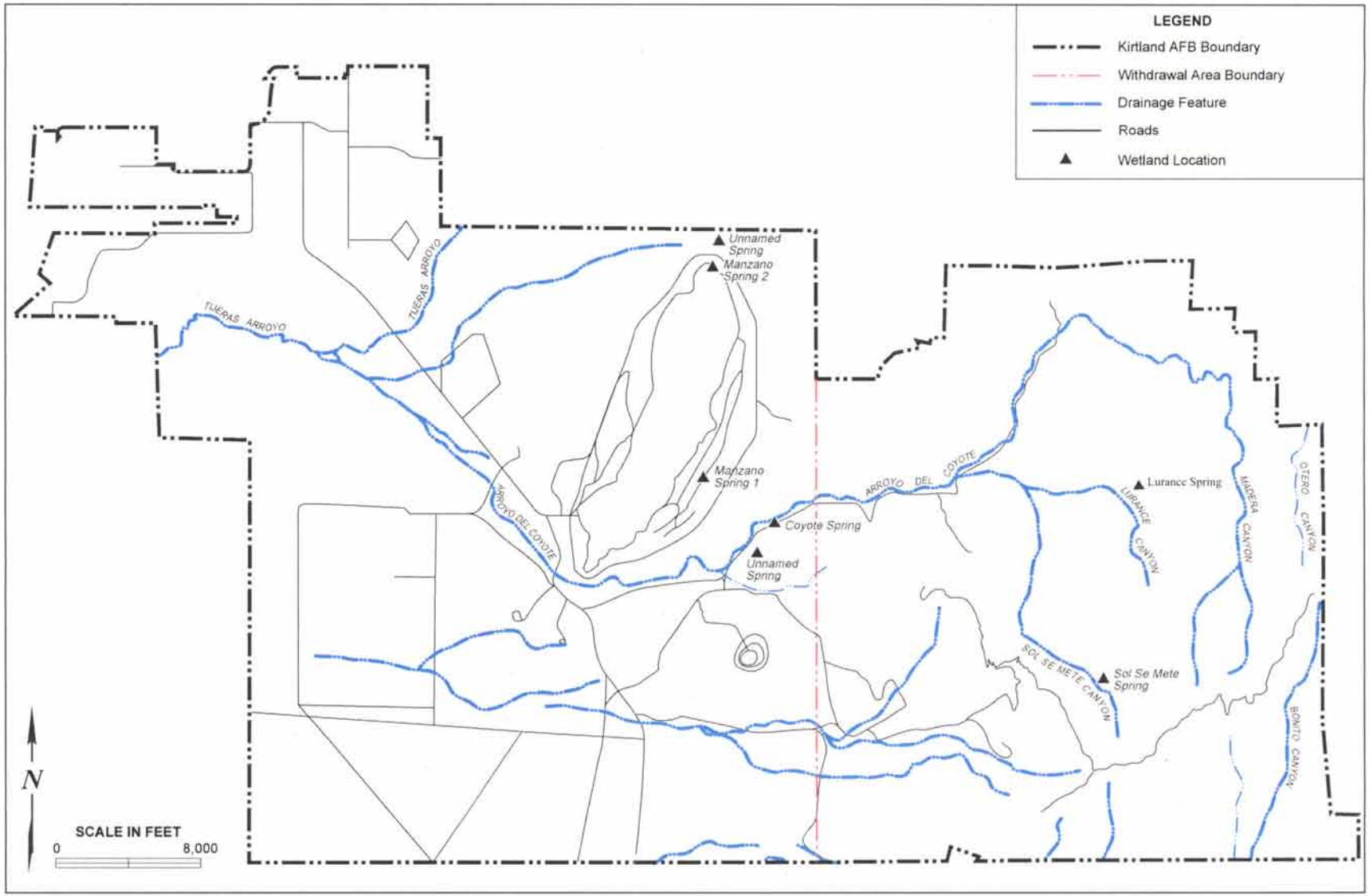
Kirtland Air Force Base Soils

4-2



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Drainages and Wetland Locations at Kirtland Air Force Base

FIGURE

4-3

Seven small wetlands occur on Kirtland AFB. Most only occupy a few hundred feet or less of land. The Coyote Springs Complex is the largest wetland, covering several hundred square feet, and is located along Arroyo del Coyote.

Kirtland AFB is located within the limits of the Rio Grande Underground Water Basin, which is defined as a natural resource area and is designated a "declared underground water basin" by the State of New Mexico. The Basin is regulated by the state as a sole source of potable water, although the Albuquerque area will be supplemented in the future with surface water diverted from the San Juan and Chama Rivers to the Rio Grande (USAF 1999). The average depth to groundwater beneath Kirtland AFB is 450 to 550 feet. The Rio Grande Underground Water Basin is fed by the Santa Fe Aquifer, which has an estimated 2.3 billion acre-feet of recoverable water. This aquifer is most likely recharged east of the installation in the Manzanita Mountains where the sediment soils materials favor rapid infiltration (USAF 1991).

A 100-year floodplain encompasses Tijeras Arroyo and Arroyo del Coyote, following their paths. These are the only two arroyos with a floodplain on the base (Figure 4-4). Arroyo del Coyote joins Tijeras Arroyo about one mile west of Tijeras Golf Course. These arroyos run intermittently after heavy rains (USAF 1999). Vegetation can encroach on the Tijeras Arroyo channel and obstruct the flow of water; this obstruction can cause flooding, especially during high intensity thunderstorms between May and October (USACE 1979b). Tijeras Arroyo and Arroyo del Coyote floods occur infrequently and are characterized by high peak flows, small volumes, and short duration.

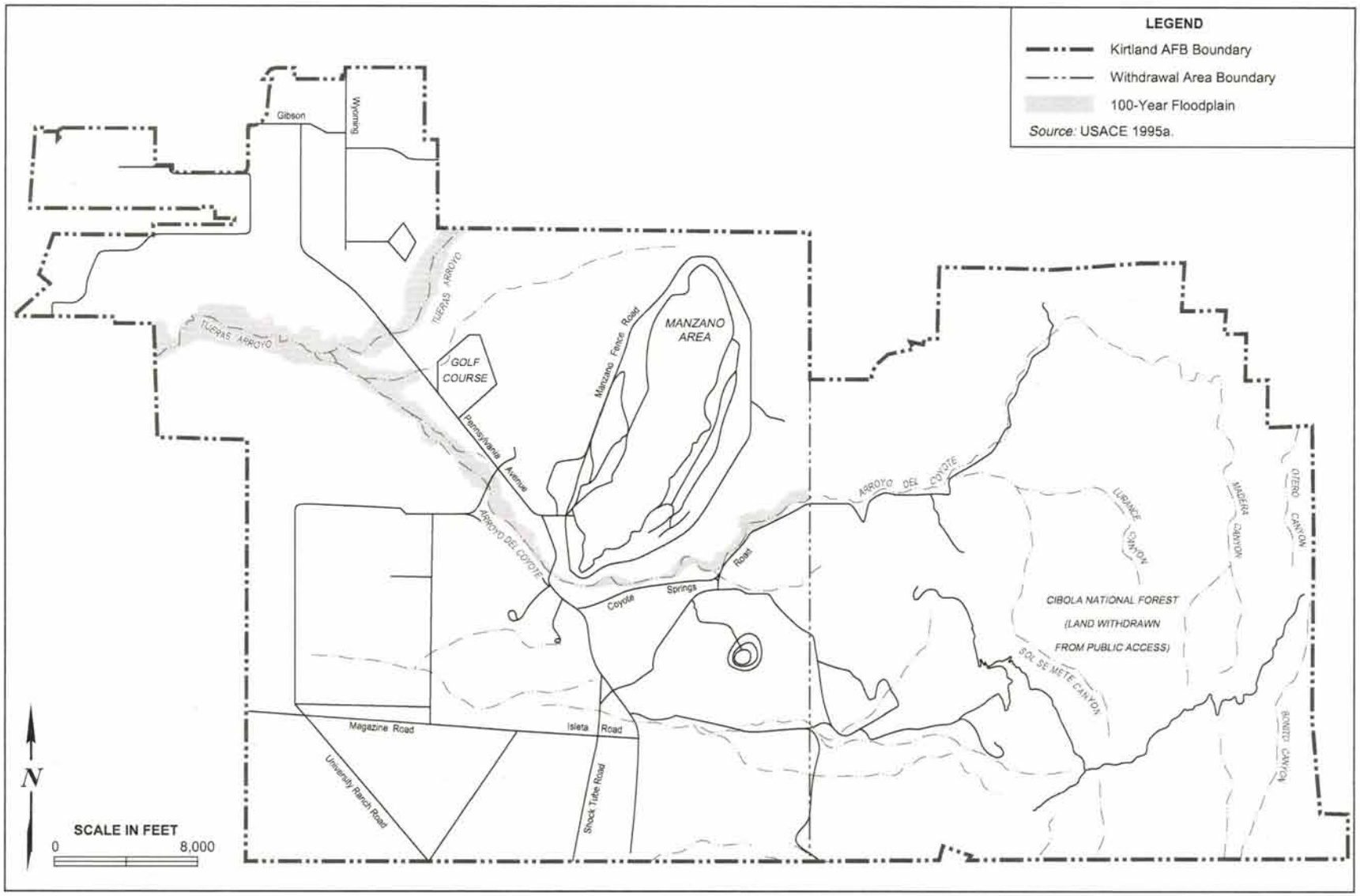

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FIGURE

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100-Year Floodplain on Kirtland Air Force Base and the Withdrawal Area

4-4

CHAPTER 5
ECOSYSTEMS AND THE BIOTIC ENVIRONMENT

5.1 ECOSYSTEM CLASSIFICATION

Kirtland AFB lies in a region that represents the intersection of four major North American physiographic and biotic provinces: the Great Plains, Great Basin, Rocky Mountains, and Chihuahuan Desert. Biotic communities in the region developed under the influence of each of these provinces.

5.2 VEGETATION

5.2.1 Historic Vegetative Cover

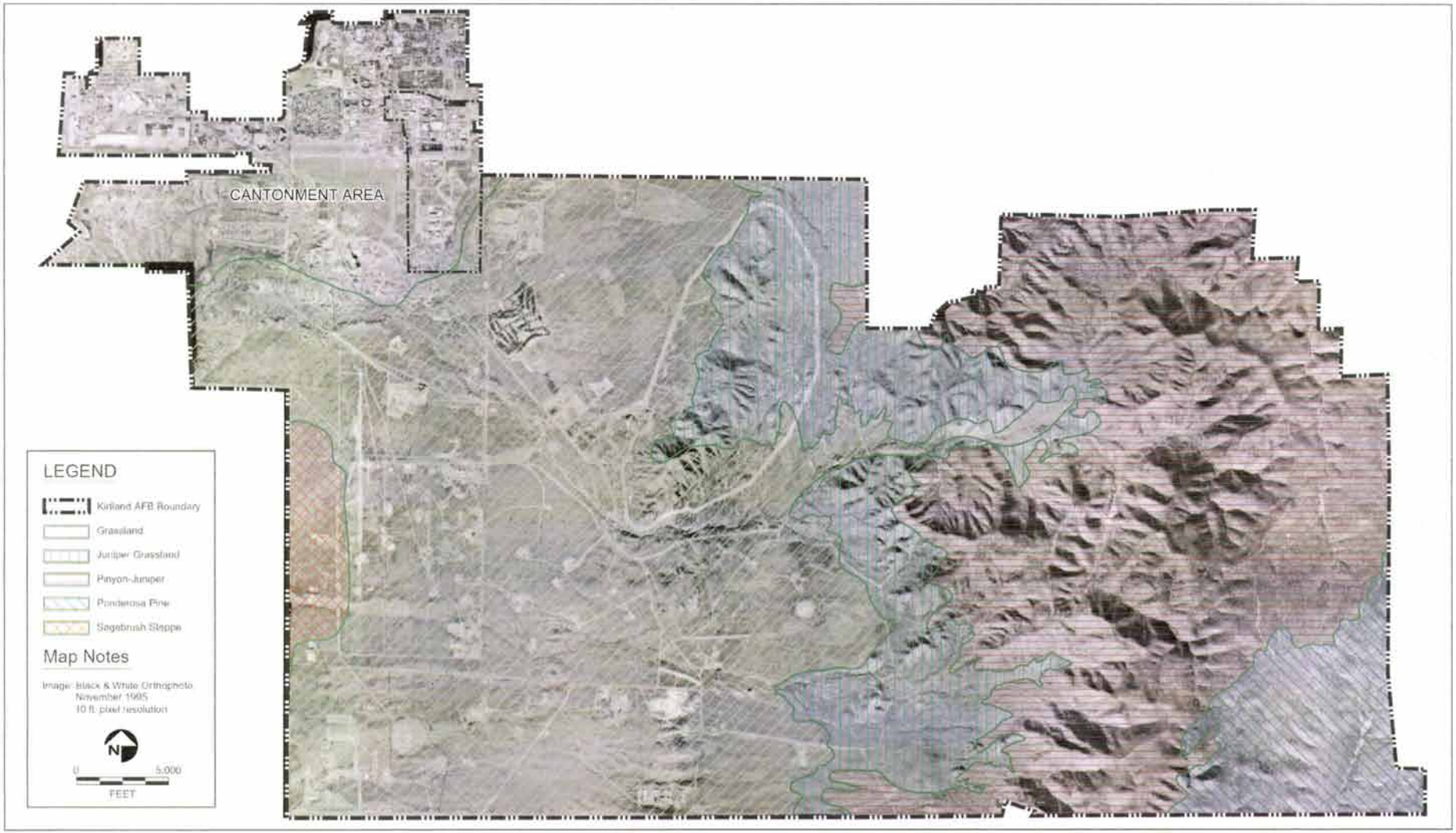
As previously stated, Kirtland AFB lies within the Arizona/New Mexico Plateau and Arizona/New Mexico Mountains Level III Ecoregions of New Mexico as well as the Albuquerque Basin, Conifer Woodlands and Savannas, and Rocky Mountain Conifer Forests Level IV Ecoregions of New Mexico (EPA 2006). Before the acquisition of land for what is now Kirtland AFB, the area was range land used for livestock grazing and typical ranching as well as mining operations. These operations ceased, for the most part, when Kirtland AFB occupied the land in the mid-1940s. Since then, some of the vegetation has been cleared for operational developments, such as the use of the Explosive Ordinance Disposal area, while the remainder, particularly within the Withdrawal Area, has remained primarily undisturbed.

5.2.2 Current Vegetative Cover

Four main plant communities are found on Kirtland AFB and in the Withdrawal Area (Figure 5-1):

- Grassland (includes sagebrush steppe and juniper woodlands),
- Pinyon-Juniper Woodlands,
- Ponderosa Pine Woodlands, and
- Riparian/Wetland/Arroyo.

Transitional areas are found between these communities and contain a mixture of representative species from the bordering areas. Grassland and pinyon-juniper woodlands are the dominant vegetative communities at Kirtland AFB. The riparian/wetland/arroyo community is confined to drainages and isolated areas inundated by surface water during at least some part of the year (see Figure 4-3). The ponderosa pine woodland community is found along the eastern boundary of the Withdrawal Area. Flora known to occur on base are listed in Appendix E.



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Vegetation Communities on Kirtland Air Force Base and the Withdrawal Area

FIGURE

5-1

5.2.2.1 Grassland Community

This community is found between elevations of 5,200 and 5,700 feet at Kirtland AFB. In the foothills of the Manzanita Mountains, grasslands are found as high as 6,900 feet. Before the land was acquired by the military, the area was rangeland. Since grazing has been eliminated for the past sixty years, much of these grasslands are in good condition. Primary grass species here include ring muhly, Indian ricegrass, blue grama, black grama, six-weeks grama, and spike dropseed (Kirtland AFB 2000). Shrubs commonly found in the grassland community include sand sage brush, winter fat, and broom snakeweed. Other species encountered include red three-awn, purple three-awn, six-weeks three-awn, hairy grama, mesa dropseed, four-wing saltbush, Apache plume, plains prickly pear, and great plains yucca. Transitional shrublands can be found between the grassland and pinyon-juniper woodland communities, with many species from both communities inhabiting these areas.

The grassland community at Kirtland AFB was further delineated into two more community types during a baseline biological survey (Kirtland AFB 2001). Sagebrush steppe is found along the western boundary of the base. Sand sagebrush is the dominant cover species, with the understory being similar to that of the adjacent grasslands. However, in the sagebrush steppe the understory is less dense, with cryptogamic crust covering areas of exposed ground. Juniper woodlands occur along the eastern edge of Kirtland AFB proper and the western portion of the withdrawn lands. This community type is similar to the grasslands to the east except for the greater abundance of one seeded juniper. The presence of this shrubby tree creates a savanna like habitat in an otherwise treeless area. Juniper woodlands are found at a slightly higher elevation then the surrounding grassland. This habitat type provides a transition into pinyon-juniper woodlands.

5.2.2.2 Pinyon-Juniper Woodland Community

The pinyon-juniper woodland community ranges in elevation from 6,300 to 7,500 feet. This plant community is composed of primarily Colorado pinyon pine and one seeded juniper, with an understory of shrubs and grasses. At most elevations, this community consists of open woodland with blue grama and, to a lesser degree, side-oats grama dominating the understory. Other species associated with this plant community are Rocky Mountain juniper, broom snakeweed, rubber rabbitbrush, threadleaf groundsel, and alderleaf mountain mahogany.

5.2.2.3 Ponderosa Pine Woodland Community

The ponderosa pine woodland community is found in the highest elevations of the Withdrawal Area. It is typically found between 7,600 to 7,988 feet (USGS 1991c). Primary species include ponderosa pine, Colorado pinyon pine, Rocky Mountain juniper and Gambel oak. Intermingled with these species are creeping barberry, New Mexican locust, and snowberry (Elmore 1976). One-seeded juniper is also present, as well as hop-tree and alderleaf mountain mahogany. It is relatively undisturbed, although tree thinning for fuels reduction operations do take place within the USFS Withdrawal Area (USAF 2004).

5.2.2.4 Riparian/Wetland/Arroyo Community

The riparian/wetland/arroyo community consists of species that have a greater moisture requirement than species common to the other communities on the base. These plant communities are found along Tijeras Arroyo, Arroyo del Coyote, and at the various springs located throughout Kirtland AFB. Species here include cottonwood, hop tree, Apache plume, yerba mansa, three-square sedge, wire rush, orchard grass, cattail, and the salt cedar. Most of the small, scattered wetlands on Kirtland AFB are in good condition and occur in conjunction with other plant communities. Coyote Springs has had three phases of wetland restoration completed: removal of man-made structures and debris; removal of salt cedar; and construction of a pond.

5.2.3 Turf and Landscaped Areas

Landscape is defined as "the composite of natural and human features that characterize the surface of the land, including spatial, textural, compositional and dynamic aspects of the land" (Marsh 1991). Landscaping is often used to improve the visual aesthetics of an area to promote a pleasing atmosphere. Kirtland AFB promotes water conservation landscaping by using xeriscape methods combined with native plant materials.

Landscaping may be a very involved process, or something as simple as the upkeep of natural vegetation through weeding and or mowing. Land areas that are maintained/landscaped in some way are referred as improved areas (refer to Figures 3-2a and 3-2b).

5.3 FISH AND WILDLIFE

Native fauna includes terrestrial and aquatic vertebrates and invertebrates. Terrestrial vertebrates include species groups such as large and small mammals, birds, amphibians, and reptiles. The only aquatic habitats on lands managed by Kirtland AFB are the small ponds at the golf course and isolated wetlands.

Wildlife falls under the jurisdiction of the New Mexico Department of Game and Fish (NMDG&F) and the U.S. Fish and Wildlife Service (USFWS) for migratory birds and federally threatened and endangered species, which categorizes species as game, non-

game, threatened, or endangered. T&E species are addressed in this document under Section 5.4. Other laws protecting wildlife include, but are not limited to, the Bald Eagle Protection Act of 1940 (protects bald and golden eagles), the Migratory Bird Treaty Act (protects neotropical migrants), and the Endangered Species Act. Refer to Section 2.1 for additional laws and regulations.

Wildlife communities at Kirtland AFB are typical of those in woodland and grassland habitats in the central New Mexico region. The following provides information on the wildlife found or expected to be found on Kirtland AFB and in the Withdrawal Area by vegetation community. Species may be transient and travel or inhabit several communities, or exist in transitional areas between vegetation communities.

In developing this section, numerous survey reports, as well as visual confirmation accounts, were taken from various sources to achieve the most complete and accurate data possible. Complete species lists can be found in Appendix F.

5.3.1 Grassland Community

Common birds associated with the grasslands at Kirtland AFB include the horned lark, scaled quail, mourning dove, greater roadrunner, American crow, northern mockingbird, Crissal thrasher, lark sparrow, black-throated sparrow, western meadowlark, brown-headed cowbird, and house finch.

Raptor species known or expected to be found in the grassland habitat include the northern harrier, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, prairie falcon, great horned owl, and burrowing owl. Additionally, turkey vultures are common scavengers in this habitat. Raptors use the Kirtland AFB grassland areas for hunting throughout the year, but the lack of nesting sites (e.g., trees and cliffs) in these areas limits the use of this habitat for breeding. However, manmade structures may occasionally be used by some species for nesting.

Rabbits, hares, and rodents dominate the mammal community in the grasslands. These include desert cottontail, black-tailed jack rabbit, spotted ground squirrel, Gunnison's prairie dog, silky pocket mouse, Ord's kangaroo rat, banner-tailed kangaroo rat, Merriam's kangaroo rat, western harvest mouse, deer mouse, white-footed mouse, and northern grasshopper mouse. Mammalian predators in the grassland community include the coyote, kit fox, badger, striped skunk, and bobcat.

A variety of reptiles and amphibians are found within Kirtland AFB grasslands. Many of these species have extensive periods of dormancy during dry conditions, and rapid breeding cycles when temporary ponds appear after rains. Reptiles and amphibians found on Kirtland AFB and in the Withdrawal Area include the Woodhouse's toad, red-spotted toad, New Mexico spade foot toad, western box turtle, little-striped whiptail lizard, short-horned lizard, lesser earless lizard, bull snakes, western rattlesnakes, and glossy snakes.

5.3.2 Pinyon-Juniper Woodland Community

Most of the species described in the grassland communities extend into the pinyon-juniper woodland community, at least in the open savannas of the lower elevations. Among the reptiles and amphibians present in the woodlands are the tiger salamander, Chihuahuan spotted whiptail lizard, tree lizard, and eastern fence lizard. Snakes in this habitat include the diamondback rattlesnake, mountain patchnose snake, and the desert striped whip snake.

Birds found in this community include the Cooper's hawk, common poorwill, black-chinned hummingbird, northern flicker, ladder-backed woodpecker, Cassin's kingbird, ash-throated flycatcher, western wood-pewee, scrub jay, common raven, juniper titmouse, mountain chickadee, bushtit, Bewick's wren, rock wren, western bluebird, Townsend's solitaire, American robin, yellow-rumped warbler, Grace's warbler, MacGillivray's warbler, western tanager, black-headed grosbeak, rufous-sided towhee, and chipping sparrow.

Mammal communities also gradually change with the transition between grassland and woodland vegetation. This transition often corresponds to an increase in the coarseness of the soil and greater amounts of rock outcrops, which are essential elements in the habitat of some mammal species. Mammals found primarily in the woodland include the Colorado chipmunk, rock squirrel, rock pocket mouse, brush mouse, pinyon mouse, rock mouse and white-throated woodrat. Other mammals that might occur in more densely wooded areas are the porcupine, black bear, mountain lion, and gray fox.

5.3.3 Ponderosa Pine Woodland Community

Many of the same mammals, birds, reptiles, and amphibians that are found in pinyon-juniper woodlands also exist within the ponderosa pine woodland community. Additional species include Abert's squirrel, nut hatches, western screech owl, Steller's jay and ruby-crowned kinglet.

5.3.4 Riparian/Wetland/Arroyo Community

Wetlands are attractive to wildlife as water sources and areas of forage. The presence of ephemeral or permanent water sources and the greater diversity of trees and shrubs in these habitats provide microhabitats that are unique in comparison to the surrounding landscape.

Canyons that contain riparian or wetland habitat are important to wildlife, providing food, water, and cover to many species. Lurance Spring, Sol se Mete Spring, and Coyote Springs are permanent sources of water in the canyon areas. Additional man-made water sources for wildlife have been placed near the Burn Site, in Sol se Mete Canyon, in the Fourhills area and near the Facility for Acceptance, Calibration & Testing Site.

In general, the wildlife communities of the arroyos and canyons are derived from the adjacent grassland and woodland communities. In addition to those listed in Sections 5.3.1, 5.3.2, and 5.3.3, amphibian and reptile species in the riparian and wetland habitats include the tiger salamander and the Great Plains skink. Birds found in these habitats include the western screech owl, broad-tailed hummingbird, plumbeous vireo, western tanager, northern oriole, rufous-sided towhee, and the song sparrow. Most large mammal species of the area will use the canyons and arroyos for feeding, water, travel corridors, or shelter. Species with affinities for this habitat are the gray fox, ringtail cat, and skunks.

5.3.5 Landscaped Areas

This environment can be very appealing to many species for several reasons. Rabbits and rodents frequent grassy areas. Increases in the populations of rabbits and rodents will draw coyotes and other species that prey upon them. Coyotes have been known to feed on prairie dogs in the base campground and are often found around the golf course and riding stables. Bull snakes and western rattlesnakes have also been observed at the riding stables, golf course, and other semi-improved lands.

Common bird species include starlings, robins, pigeons, grackles and burrowing owls.

Fish species occurring on Kirtland AFB only consist of those that were relocated to the golf course ponds from Christian Lake when the lake was drained in December 1999, and include catfish, sunfish, and carp.

5.3.6 Critical Habitat

Critical habitats are those areas of land, air, or water that are essential for maintaining or restoring threatened or endangered plant or animal populations. Neither the NMDG&F nor the U.S. Fish and Wildlife Service (USFWS) has designated or identified any critical habitat on Kirtland AFB. Surveys and literature indicate that important habitats on the base and in the Withdrawal Area include the wetlands, which are rare in this region, providing water in an otherwise arid environment. Other important habitats on base include prairie dog towns, which provide nesting habitat for the burrowing owl, and areas between 5,900 and 6,600 feet containing open juniper woodlands, which are used as nesting habitat by the gray vireo.

5.4 THREATENED AND ENDANGERED SPECIES

The species of concern potentially occurring on Kirtland AFB and in Bernalillo County are listed in Appendix G. The gray vireo, a state threatened species, as listed by the NMFG&F, is the only federally or state-listed species known to occur on the base or in the Withdrawal Area. The USFS considers the gray vireo a sensitive species. In 2003, a base-wide gray vireo survey was conducted in which 53 territories were mapped (Kirtland AFB 2004a). This survey identified more then twice as many gray vireo locations as previous surveys conducted in the early 1990's. Territories were found

throughout the juniper woodland community in an elevational belt of 5,850 to 6,600 feet. Gray vireos occupied areas with an open canopy (i.e. less than 25 percent) with one-seeded juniper as the dominate tree/shrub species. During the summer, the Withdrawal Area has the largest gray vireo colony in New Mexico (Schwarz 1998). Potential gray vireo habitat based on the 2003 survey is presented in Figure 5-2.

The western burrowing owl, a federal species of concern, is a common resident at Kirtland AFB. It is very closely associated with the prairie dog colonies on base, as they use abandoned prairie dog burrows for nesting. Owls generally occur on base between March through October before migrating south, although a few birds may occur on base during mild winters. Burrowing owl inventories have been conducted every year since 1994, and in 2005 a migration study was initiated to identify where nesting owls at Kirtland AFB go to winter. Since burrowing owls use old prairie dog burrows for nesting, a Prairie Dog Management Plan (Appendix C) was developed for the base, which takes into account burrowing owl habitat requirements.

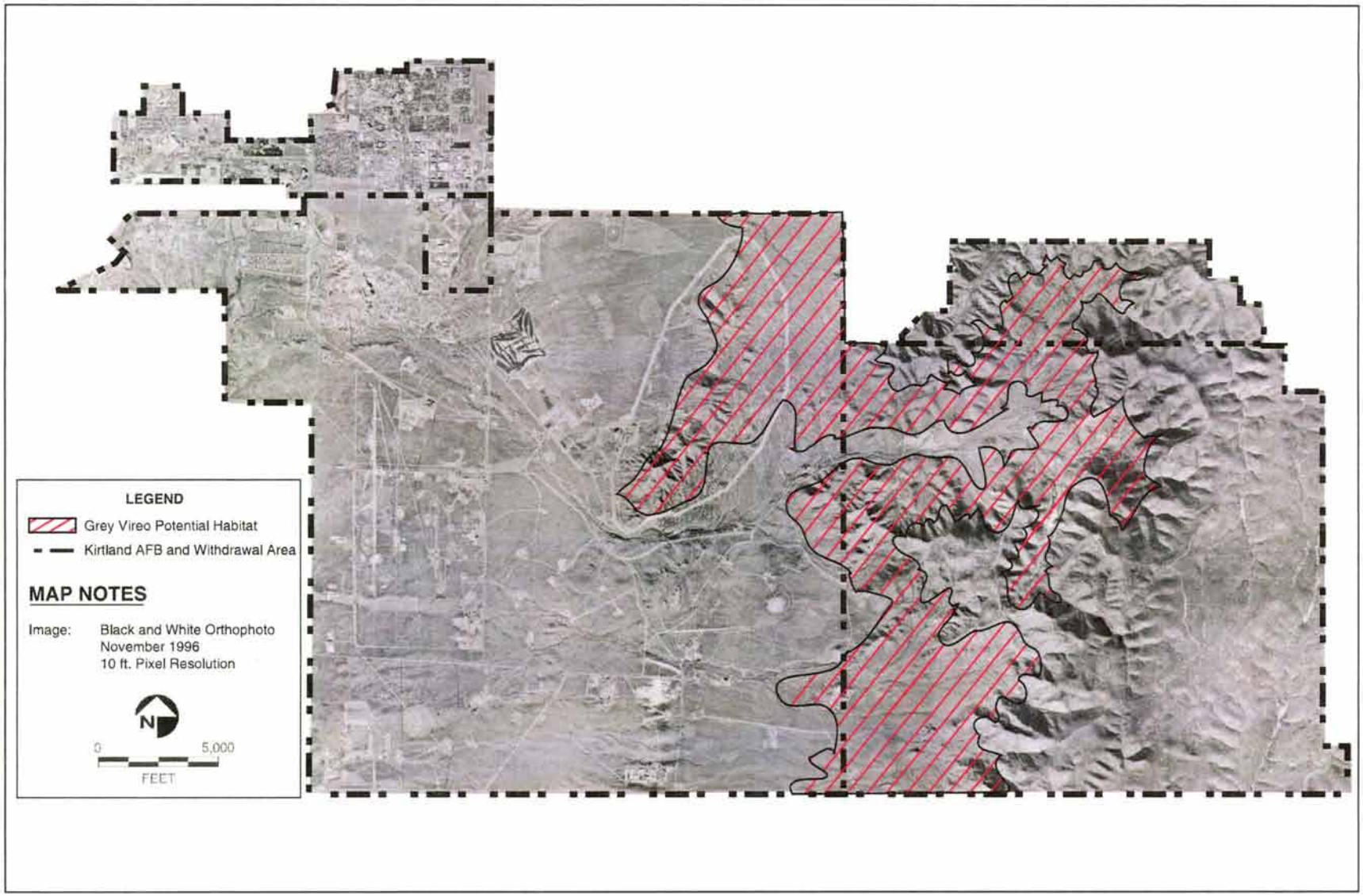
The loggerhead shrike is also a federal species of concern. It has been observed on the base and in the Withdrawal Area and is found in the area throughout the year. Loggerhead shrikes occupy grassland, pinyon-juniper woodlands, and riparian habitats.

Mountain plovers, a federal species of concern, are not known to occur on base. However, in 2003, an adult with two chicks was observed just south of the base on the Isleta Pueblo Indian Reservation (Kirtland AFB 2004a). Appropriate nesting habitat for this species is limited on base, therefore, it is unlikely that the mountain plover uses Kirtland AFB during the nesting season. However, the southern grasslands of the base may potentially be used as brood-rearing habitat or during migration.

The Texas horned lizard is another federal species of concern. A reptile and amphibian survey was conducted the summer of 2001 and 2003. During these surveys no Texas horned lizards were found. Surveys conducted by SNL indicate that individuals were found near the intersection of Lurance and Sol se Mete Canyons as well as the North Thunder Range (Sullivan 1994). However, regional herptofauna experts believe that individuals found in Bernalillo County, which includes Kirtland AFB, may be escaped or liberated pets as the nearest known population of Texas horned lizards is found 80 miles south of Kirtland AFB (Degenhardt et al. 1996).

5.5 WETLANDS

Known wetland locations were mapped in 2000 using the Global Positioning System and are shown on Figure 4-3. An additional wetland was identified during the 2001 Baseline Biological Survey and is also included in the figure. The USACE previously determined which springs were wetlands, gave a description of waters of the U.S. regulated pursuant to Section 404 of the Clean Water Act, and prepared a restatement of the location of the 100-year floodplain determined in a 1979 study (USACE 1995) (Appendix C). Table 5-1 provides a summary of the wetland delineations on Kirtland AFB and the Withdrawal Area made by the USACE in a 1995 survey.



INRMP

Potential Gray Vireo Habitat on
Kirtland Air Force Base and the Withdrawal Area

FIGURE

5-2

Table 5-1. Wetland Determinations at Springs Occurring on Kirtland AFB and the Withdrawal Area

Site Name	Number of Springs	Wetland
Coyote Springs	1-4	Yes
Unnamed Spring	1	No (riparian area)
Unnamed Spring	2	Yes
Unnamed Spring	1	Yes
Sol se Mete Spring[a]	1	Yes
Lurance Spring[a]	1	Yes[b]
G Spring	1	No (riparian area)
Manzano Spring 1	1	Yes
Manzano Spring 2	1	Yes
Manzano Spring 3	1	No (rock seep)
Manzano Spring 4	1	No (probable rock seep)

Source: USACE 1995.
Notes: a = Located in the Kirtland AFB Withdrawal Area, not on Kirtland AFB proper.
b = Not visited; assumed a wetland.

5.6 OTHER NATURAL RESOURCE INFORMATION

Several biological surveys have been completed during the last INRMP period. These include a baseline natural resources inventory, gray vireo and mountain plover surveys, vegetation survey, and amphibian and reptile surveys, base wide raptor survey, and a prairie dog survey, while a predator survey, loggerhead shrike survey and a noxious weed survey are currently being conducted. The baseline natural resources inventory delineated vegetation communities, areas where erosion is occurring, vegetation reconnaissance points, weed invasion, and areas in need of revegetation. Over 50 gray vireo territories have been identified on base as well as the first report occurrence of a nesting mountain plover in Bernalillo County in over 50 years. The amphibian and reptile survey has identified 29 species on base, two of which are sensitive species: Texas long-nosed snake, and the desert massasauga. Prairie dog colonies have been delineated for the base, and a predator survey is currently being conducted to identify the habitats and distribution of these species.

CHAPTER 6
MISSION IMPACTS ON NATURAL RESOURCES

This section describes the mission impacts on natural resources and related issues and concerns relevant to the protection and management of natural resources on Kirtland AFB. Emphasis is placed on identifying impacts and issues that would result in adverse impacts to natural resources or issues that may have the potential to affect future development or mission expansion.

6.1 CURRENT MAJOR IMPACTS

Current mission impacts that have the greatest potential to affect natural resources on Kirtland AFB include aircraft and mission training and research and development. Impacts resulting from mission activities include aircraft noise, bird-aircraft strikes, restoration sites, water pollution, and limited air pollution.

In December 2002, Kirtland AFB applied for a Title V Operating Permit that is still waiting approval by the City of Albuquerque.

6.1.1 Land Use

Kirtland AFB is approximately 5 miles southeast from downtown Albuquerque. Total land area of Kirtland AFB is 52,678 acres. Land use varies from developed urban in the northwest portion of the base from aircraft operations/maintenance, airfield (runway, taxiways, apron), community, housing, industrial, medical, administrative/research, open space, associate owned, and outdoor recreation. In the vicinity of Kirtland AFB, land use varies from urban to open rangeland. Immediately north of the installation, land use is predominantly urban and suburban. Open spaces and National Forest System land are present northeast and east of the base. West of Kirtland AFB, land use is a mixture of urban areas and open space. South of the installation, the Isleta Pueblo lands are generally open space and forest or vacant land.

Improved lands make up 2,045 acres (4 percent of the installation), semi-improved lands consist of 2,730 acres (5 percent of the installation), and unimproved lands make up 40,378 acres (76 percent of the installation). The DOE controls 7,525 acres.

The AICUZ program represents a land use component that provides noise and safety data to assist surrounding communities in land use planning. For Kirtland AFB and the Albuquerque International Sunport, AICUZ studies are the responsibility of the City of Albuquerque Aviation Department with the assistance of the Federal Aviation Administration and Kirtland AFB.

The 1995/1996 Draft Albuquerque International Sunport Part 150 Study and supplemental reports represent the AICUZ for the base (Kirtland AFB 2002). The Clear Zone (CZ) begins at the end of a runway and extends out for 3,000 feet. Only limited agricultural land uses are allowed within the CZ and all other uses are not permitted.

Currently, there are no incompatible land uses within the CZs (Albuquerque 2003). Accident Potential Zone (APZ) I extends from the CZ an additional 5,000 feet. Land uses permitted within APZ I include agricultural, industrial, and limited commercial and recreational uses. APZ II extends from APZ I an additional 7,000 feet. Land uses within APZ II include all agricultural, commercial, industrial, public, limited recreational and limited residential uses. There are no incompatible land uses within either APZ I or APZ II.

The AICUZ map was updated in 2002 but has not been approved by the City of Albuquerque. Noise contours associated with land uses are based on the Day-Night Average Sound Level (DNL) or average sound level measured in decibels over a 24-hour period. The DNL 65 Contour, DNL 70 contour, and DNL 75 contour represent acceptable and unacceptable noise levels for various land uses. Table 6-1 shows existing land use within existing noise exposures from the supplemental update of the Albuquerque International Sunport Federal Aviation Regulation Part 150 Study.

Table 6-1. Existing Land Use within Existing Noise Exposure Map (2002)

Land Use	DNL 65	DNL 70	DNL 75
Residential	9 acres	0 acres	0 acres
Commercial/Retail	25 acres	0 acres	0 acres
Industrial	161 acres	51 acres	0 acres
Undeveloped	188 acres	16 acres	0 acres
Recreation	18 acres	0 acres	0 acres
Public	16 acres	0 acres	0 acres
Airport/Kirtland AFB	2,723 acres	1,368 acres	704 acres

Source: Albuquerque 2003.

Air Force Manual 91-201, *Explosives Safety Standards*, represents the Air Force guidelines for complying with explosives safety. Defined distances called quantity-distance arcs must be maintained between explosive storage areas. Development is restricted within these arcs for personnel and property safety. Explosive Safety Zones on Kirtland AFB occur mostly in the central and southwestern portions of the base with some large areas located in the Withdrawal Area (Kirtland AFB 2001). These areas are listed below:

- Chestnut Site,
- 5,000 foot radius Blast Tunnel,
- AFRL Laser Firing zone,
- Munitions storage area,
- 3,750 foot radius USAF Explosive Ordnance Disposal Range,
- 3,000 foot radius Sol Se Mete Aerial Cable Test Site,
- 10,000 foot buffer zone radius Lurance Canyon Test Site,
- 5,000 foot buffer zone radius Electro Explosive Area,

- DOE Lovelace Area,
- Thunder Ranger Area,
- Complex 9920,
- Area surrounding Building 9946,
- F.A.C.T. Site,
- Deer Site,
- Explosive Test Facility, and
- Shock Thermodynamic Applied Resource Facility.

6.1.2 Water Resources

Water on base is supplied by five installation water wells and two separate, but interconnected distribution systems. These systems were developed separately for Sandia Base and Kirtland AFB before they were combined into a single installation. Water is also purchased from the City of Albuquerque. Water purchased from the city is primarily for use in meeting peak demands for providing water when wells are out of service.

The Water Management Policy and Action Plan for Kirtland AFB was an agreement between the USAF, State of New Mexico, and the DOE to reduce 1994 per capita water usage by 30 percent by 2004. It was developed in 1995 and adopted by Kirtland AFB in 1996. It expired in December 2004 and Kirtland AFB has not discussed any new water conservation goals with the City of Albuquerque (Kirtland AFB 2005b).

Storm water in the developed area drains into small culvers toward Gibson Boulevard along the Kirtland AFB/City of Albuquerque boundaries. There are also four detention ponds in the area. Stormwater discharge in the industrial/laboratory areas discharges through surface runoff or three large culverts that drain toward the Tierjas Arroyo on the south (Kirtland AFB 2002).

Kirtland AFB does not have separate industrial and municipal wastewater systems. The City of Albuquerque treats all of the sanitary sewage produced by Kirtland AFB. By the end of 2001, the base contributed 2.5 million gallons per day of wastewater to the city facility (Kirtland AFB 2002). An industrial pretreatment program administered by the City of Albuquerque regulates industrial discharges from the base to sewer lines. A City of Albuquerque Wastewater Permit was reissued to Kirtland AFB in 2005 under the Sewer Usage and Wastewater Control Ordinance. Kirtland AFB's permit is issued by the City of Albuquerque's publicly owned treatment works, which is currently regulated by a National Pollutant Discharge Elimination System (NPDES) Permit. Kirtland AFB has an NPDES General Storm Water Permit for industrial activities and an active program for construction projects that requiring a NPDES General Stormwater Permit for Construction Activities.

6.1.3 Traffic

Traffic congestion at the base is consistent with the current mission involving operational activities at existing facilities. Traffic at Kirtland AFB includes vehicle, pedestrian, and aircraft traffic. Traffic flows relatively smoothly in the western portion of the developed area due to light traffic volumes and favorable intersection operations. A greater portion of the base population is located in the eastern portion of the developed area and many signalized intersections have been installed to control traffic. Traffic problems on Kirtland AFB generally occur during peak traffic periods early in the morning and later afternoon. Areas that are unacceptably congested during peak hours tend to be Pennsylvania Street (south of Gibson Boulevard.), Wyoming Boulevard (south of M Avenue), and Pennsylvania Street (north of Hardin Drive), and Truman Street (south of Truman Gate). Pedestrian traffic includes walking between facilities as well as pedestrian recreation activities such as walking or jogging.

6.1.4 Bird Aircraft Strike Hazard

BASH is concerned with aircraft collisions with birds and other wildlife. The 377 Maintenance Group/Chief of Airfield Management monitor bird/wildlife populations, maintains grass height, drainage ditches and reports any problems. Grass must be mowed within 15 feet to a height of 4-8 inches along edges of runways, taxiways and airfield lighting.

During fiscal year 2000 through fiscal year 2005 there were 51 BASH incidents (AFSC 2006). Species included the sage thrasher, American warblers, chestnut-collared longspur, horned lark, perching birds, plumbeous vireo, thrushes and forktails, barn swallow, American rock wren and bats (AFSC 2006).

The 377 ABW/Civil Engineer (CE) responds to requests to eliminate or reduce environmental conditions that may attract birds or wildlife to the airfield. Dead birds and other animals are removed from airfield by the CE to avoid collision with aircraft or to prevent attracting raptors. The CE is also responsible for controlling pests on the airfield using Pest Management Plan practices and eliminating roosting sites. Other responsibilities include bird proofing buildings and hangars by screening windows, closing doors, blocking entry holes and may also use netting, trapping and removal.

The Bird Hazard Working Group is a group consisting of various representatives that collect data on bird strikes and makes recommendations to reduce hazards as well as operational procedures. They serve as the point of contact for all off base BASH issues (Kirtland AFB 2004b).

6.1.5 Fuel Storage Tanks

There are 28 active registered aboveground storage tanks (ASTs) on Kirtland AFB and two external floating roof tanks for jet propulsion fuel grade 8 (JP-8). They range in size

from a 2,000 gallon aviation gas tank to a 4,000,000 gallon JP-8 tank (New Mexico Environment Department [NMED] 2005, Kirtland AFB 2002).

Kirtland AFB no longer has any regulated/registered underground storage tanks (USTs). All regulated USTs were removed during 1998 and 2002. Kirtland AFB is the only AFMC installation that is free of regulated USTs (Kirtland AFB 2006b).

According to the installation Spill, Prevention, Control, and Countermeasure Plan, secondary containment for ASTs not certified double-walled consists of earthen berms of sand that are designed to contain contents of ASTs plus freeboard for precipitation. However, the berms do not prevent oil saturation. An impervious liner or concrete overlay should be added to the earthen berms. ASTs that are used on base are engineered, designed and constructed with a steel-wall tank encapsulated in a concrete vault to hold and store flammable and combustible liquids (Kirtland AFB 2003). Leak detection systems are installed on each tank. The Kirtland AFB Spill Plan sets policies and prevention measures regarding spills.

6.1.6 Installation/Environmental Restoration Program

Kirtland AFB began its Installation/Environmental Restoration (IRP/ERP) Program in 1981 with an Installation Restoration Program Phase I Records Search identifying 25 sites of potential contamination sources (Kirtland AFB 2005c). A permit was issued to Kirtland AFB in 1990 to operate as a hazardous waste disposal facility. They operate under the Resource Conservation and Recovery Act (RCRA), as amended permit. Currently, there are 194 IRP/ERP sites and 6 Areas of Concern (Kirtland AFB 2005b). Twenty of these sites are solid waste management units that are waiting for Final No Further Action Approval through the NMED. These sites are under the control of the Environmental Restoration Program and the Environmental Compliance Program at Kirtland AFB and address contamination from past installation operations in accordance with the Comprehensive Environmental Response, Compensation, and Liability Acts, as amended and if applicable, the RCRA.

Sites in the IRP/ERP program include landfills, sewage lagoons, radioactive holding tanks, oil/water separators, drainage areas, septic systems, spill areas, fire-training areas, and others. Major contaminants to the soil and water on Kirtland AFB are associated with fuels, waste solvents, dissolved phase fuels and solvents, and low-level radiation waste (Kirtland AFB 2005c).

6.1.7 Solid and Hazardous Waste Materials

Municipal solid waste on Kirtland AFB is collected by a contractor from military housing areas and taken to landfills within Rio Rancho and Torrance Counties. Solid municipal waste generated by commercial activities is collected by Waste Management of New Mexico. Waste generated by construction and demolition activities is taken to the Kirtland AFB Landfill. All solid wastes are disposed of in accordance with USAF, Kirtland AFB, and applicable federal, state, and local regulations.

There are five closed/abandoned landfills on Kirtland AFB that date back to the 1940's. These sites are currently monitored as solid waste management units and will eventually be placed on the No Further Action list under the State of NMED (Kirtland AFB 2006b).

Hazardous waste on Kirtland AFB is managed under the Kirtland AFB Hazardous Waste Management Plan (Kirtland AFB 2004c). Kirtland AFB operates as a large-quantity generator of hazardous waste and as a treatment, storage, and disposal facility. A Resource Conservation and Recovery Act Part B Permit issued by the NMED regulate the collection and storage of hazardous waste at initial accumulation points near or at the waste generation sites. These include 90-day accumulation sites including treatment by open detonation at open burn/open detonation designated sites at the Kirtland Underground Munitions Maintenance Complex and Building 1025. Kirtland AFB has 150 initial accumulation points and two 90-day accumulation areas. Wastes are transferred to the Defense Reutilization and Marketing Office 90-day accumulation site in Building 1025 and are stored until final disposal at a permitted off-site treatment, storage and disposal facility (Kirtland AFB 2004c).

Hazardous waste collection and storage sites are managed by the Environmental Compliance Section (377 MSG/CEVC). Some wastes, such as lead-based paint, are disposed of through contractors. Photographic laboratory wastes are discharged to sanitary sewers following silver recovery and neutralization. Asbestos and asbestos-containing materials found in numerous buildings at the base are handled in accordance with the Kirtland AFB Asbestos Management Plan (USAF 2004).

Recyclable wastes are managed by a contractor that collects recyclables at office and shops throughout the installation including office paper, corrugated cardboard, kraft paper and aluminum. All recyclables are separated for pickup in accordance with the Kirtland AFB Qualified Recycling Program. Fuels, oils, and lubricants used by construction equipment and construction of new facilities, as well as, waste from facility/tank repairs and demolition are handled and disposed of in accordance with all applicable regulations.

6.1.8 Air Quality

Air quality at Kirtland AFB is a function of several factors, including the quantity and dispersion rates of pollutants in the region, temperature, the presence or absence of inversions, and topographic and geographic features of the region. The Albuquerque Environmental Health Department performs air quality functions in Albuquerque, and the Albuquerque-Bernalillo County Air Quality Control Board governs them. The 1990 amendments to the Clean Air Act (CAA) require federal agencies to conform to the affected State Implementation Plan (SIP) with respect to achieving and maintaining attainment of National Ambient Air Quality Standards and addressing air quality impacts. The CAA General Conformity Rule states that nonattainment and maintenance areas must conform to the applicable SIP. Kirtland AFB is covered by a Carbon Monoxide Maintenance Plan.

Kirtland AFB also obtains air emission source registrations, construction permits, open burning permits, and soil disturbance permits; all of which include operating or emission limits to ensure compliance with the CAA.

Title V of the CAA requires operating permits by states for major stationary sources of air pollution. The permits identify pollutants emitted by a source and identify emission limits and standards. Kirtland AFB submitted a CAA Title V permit application in December 1995 (most recently revised in 2002). Kirtland AFB is also considered a synthetic minor source of hazardous air pollutants under Title I, Section 112 of the CAA.

Kirtland AFB's mission-related air emissions are from training exercises, aircraft engine testing, activities related to aircraft refueling and maintenance, explosive ordnance disposal, fuel storage and distribution, and corrosion control activities. Non-mission-related air emissions come from external combustion, internal combustion engines, and vehicle refueling and maintenance (USAF 2005b).

6.2 POTENTIAL FUTURE IMPACTS

6.2.1 Land Use

Currently, many mission related activities are distributed throughout the developed portion of the base. In order to increase accessibility and improve traffic flow, changes to land use at Kirtland AFB would come mainly from consolidation mission related activities to the same area of the base. Airfield related activities including industrial, airfield operations, and maintenance are to be located on the flight line. Administrative and research facilities will continue to be located in the northeast portion of the base creating a "town site." New industrial development and research will be located south and east of the present airfield. Abandoned housing areas, open lots, and demolition of existing facilities would be required. However, these changes would improve the mission and operational activities on base, thus constraints to the mission from land use do not appear to be an issue.

Several facility development projects are scheduled at Kirtland AFB. These include the construction of a new Pararescue and Combat Officer Training School, AFRL Technology Park, upgrades to the Bulk Fuels Facility, base housing, and other small administrative and research facilities. Kirtland AFB has ample room for these and future facility developments, therefore no constraints to the military mission are expected from implementing facility developments. The following is a list of sites that are available for facility construction: old hospital area, south forty, Transportation Complex area, vacated military family housing areas, Gibson Gate area, Truman Gate area, 760 area, Zia Park, Eubank Gate area, Old Atomic Museum, Aprons B & C, Chemical Oxygen Iodine Laser area, and DOE Steam Plant area (Kirtland AFB 2002).

6.2.2 Water Resources

Current water resource systems including water supply and sanitary sewer are currently sufficient to accommodate growth and new facilities on base. Planned improvements include wastewater projects associated with Kirtland's Five-Year Utility Improvement Plan. Water supply improvements include the upgrading of two distribution systems, increasing water storage capacity, and installing a new drink water production well. The sanitary sewer system is being upgraded through a systematic replacement of sewer lines as well as repairing lines and lift stations. Overall, there are 20 programmed projects for water systems and 14 programmed projects for sanitary sewer improvements (Kirtland AFB 2002).

6.2.3 Traffic

In order to improve and meet current and future traffic issues as well as provide for the increase in operational activities, many future transportation improvements are planned for the installation. Improvements include providing an east-west corridor within the developed area, constructing a new Truman Gate to improve traffic flow, and extension of Eubank Boulevard to Pennsylvania Street at the east boundary.

6.2.4 Bird Aircraft Strike Hazard

BASH is not expected to change as aircraft operations should continue at a level similar to historical conditions. Monitoring and control measures have been implemented to reduce hazards. Land management practices will continue such as, maintaining grass height, pruning trees and removing vegetation which attract birds and other wildlife.

6.2.5 Fuel Storage Tanks

Fuel storage tanks always have the potential to contaminate soils and water. To reduce that threat, modification and replacement of fuel storage tanks are currently planned. Within the Bulk Fuels Facility area, many tanks, including JP-8 fuel tanks, will be repaired or constructed (USAF 2005b).

All fuel storage tanks will continue to be monitored and maintained in accordance with the Kirtland AFB Spill Management Plan, the Spill Prevention, Control, and Countermeasure Plan, and comply with state and federal spill prevention requirements.

6.2.6 Installation and Environmental Restoration Program

The presence of IRP/ERP sites on Kirtland AFB do not present a significant constraint to present or future development on base. The NMED requires the clean up of IRP sites to residential standards for No Further Action approval. Kirtland AFB is actively cleaning up all IRP sites to these standards. Three landfills on base are not part of these standards and will eventually be prepared for post-closure within approximately 30 years (Kirtland AFB 2002).

These sites will continue to be monitored and be recommended for No Further Action approval.

6.2.7 Solid and Hazardous Waste and Materials

No adverse impacts to natural resources would result from the solid waste disposal processes on base. Current and future hazardous waste will be managed and handled in accordance with the Kirtland AFB Hazardous Waste Management Plan (Kirtland AFB 2004c). No increase in waste streams is anticipated, therefore there should be no constraints to the base mission or natural resources.

6.2.8 Air Quality

Mission-related activities would result impacts to air quality if air emissions from these activities exceed the thresholds for the Title V permit application or if operation of a new facility/activity should fail to comply with the General Conformity Rule or other provisions under the CAA. Kirtland AFB has remained well under the proposed allowable limits for criteria and hazardous pollutants under their Title V operating permit application and will continue to remain under allowable limits into the foreseeable future.

6.3 NATURAL RESOURCES NEEDED TO SUPPORT THE MILITARY MISSION

Open areas are required to support the military mission at Kirtland AFB. Current missions that require open areas include training at various helicopter landing zones, firing ranges, fire breaks, and low vegetation around runways and airfields. The steep topography in the Withdrawal Area is also necessary as it provides a natural backstop for firing ranges and the Starfire Optical Range, and provides natural concealment of military operations from the general public.

6.4 NATURAL RESOURCES CONSTRAINTS TO MISSIONS AND MISSION PLANNING

6.4.1 Soils

Soils on the eastern half of Kirtland AFB are located on level to moderate slopes and consist of well drained loamy and gravelly soils. These soils present a minor constraint to development in these areas. The western half of the base (i.e. Manzano Mountain and the Withdrawal Area) contain soils lying on level to steep slopes, being well drained, very cobbly, stony, or containing rocky outcrops. Construction or use in these areas is generally confined to areas of relatively level terrain as the threat of erosion is high on moderate to steep slopes.

6.4.2 Wetlands

The seven wetlands that occur on base comprise approximately one acre of land. Most are located in rocky drainages and as a result have little impact on future missions. The

Coyote Springs wetland complex, by far the largest wetland on base, consists of several springs and is located primarily south of Coyote Springs Road. The area was once a recreational site for military personnel, but has since undergone restoration and enhancement. This level of effort on the restoration of the wetland indicates that the area is not slated for any future military missions.

6.4.3 Floodplains

Floodplains occur along Arroyo del Coyote and Tijeras Arroyo. These arroyos run intermittently after heavy rains (USACE 1979b). Although occurring infrequently, flooding in these channels is characterized by high peak flows, small volumes, and over short durations. The 100-year floodplain encompasses anywhere from 100 feet to nearly ½ mile across along these drainages, depending on the surrounding terrain.

6.4.4 Threatened and Endangered Species

The state threatened gray vireo is the only state or federally listed species known to occur on base. It utilizes the juniper woodland habitat on base. Future construction or alteration of this specific habitat would require consultation with the NMDG&F. Constraints to the mission would generally be minor as construction or alteration of the habitat would be required to be done outside of the nesting season (i.e. May –September). The burrowing owl, loggerhead shrike, and the mountain plover are federal species of concern. The mountain plover is not known to occur on base although it has been observed on the Isleta Pueblo. Both the burrowing owl and loggerhead shrike inhabit the base. Avoidance to nesting loggerhead shrikes is required. Kirtland AFB already has a program in place that identifies locations of nesting burrowing owls and has developed procedures to relocate owls if necessary. Since this program has been implemented successfully for several years' protection of these species does not constrain development at the base.

6.4.5 Bird Aircraft Strike Hazard

Bird activity near the airfield could negatively impact base missions due to BASH. The expansion of prairie dog colonies on base would create an increased BASH potential. Mission impacts from BASH incidents include delayed operations, damage to aircraft, and hazards to flight crews.

CHAPTER 7
NATURAL RESOURCES PROGRAM MANAGEMENT

7.1 NATURAL RESOURCES PROGRAM MANAGEMENT

This section describes the natural resources and land management programs at Kirtland AFB. Current issues associated with each resource as raised by base personnel, state and federal authorities are also discussed. Development and implementation of this INRMP is the responsibility of Kirtland AFBs Wing Commander with the 377th CES/CEVQ leading the effort. Table 7-1 includes a list of various plans related to the natural resources program at Kirtland AFB with the office of primary responsibility and contact information. Region 2 of the USFWS, NMDG&F, and the Sandia Ranger District of the CNF are signatories for this plan, and provide technical support and input.

Table 7-1. Resources Program Management Related Plans

Plan	Office	Telephone
Kirtland AFB General Plan	377th MSG/CE	(505) 846-7911
Natural Resource Management Plan	377th MSG/CEVQ	(505) 846-0053
Stormwater Pollution Prevention Plan	377th MSG/CEVC	(505) 846-8546
Pollution Prevention Plan	377th MSG/CEVC	(505) 846-8546
Integrated Pest Management Plan	377th MSG/CEO	(505) 846-5650
Grounds Maintenance Plan	377th MSG/CEO	(505) 846-1803
Kirtland BASH Plan	58th SOW	(505) 853-5838
Kirtland GIS	377th MSG/CEVQ	(505) 846-6994
Cultural Resources Management Plan	377th MSG/CEVQ	(505) 846-8840

7.2 GEOGRAPHIC INFORMATION SYSTEMS

GIS is a computer-based system designed to capture, store, manipulate, analyze, and display geo-referenced map data on a computer. GIS differs from Computer Aided Drafting Design systems in the fact that GIS can also correlate non-spatial data with spatial map data for analysis purposes. In a GIS system, an unlimited array of tabular data can be correlated with map features for analysis purposes. GIS is a multi-use tool that supports the INRMP, General Plan, BASH management, Cultural Resources Management Plan, planning, project site selection, and other decision-making actions. Environmental Management at Kirtland AFB uses the Geographic Environmental Management System, which is an ArcView 8.0 application for generating different layers. The Air Force uses GeoBase, an ArcIMS application. Several natural resource layers have been generated from these programs including gray vireo nest locations, burrowing owls, wetlands, roads, cultural resource sites, and floodplains.

Issues:

- Cohesion between different GIS departments within the Air Force is not occurring; thus GIS information is not being distributed efficiently.

7.3 FISH AND WILDLIFE MANAGEMENT

Kirtland AFB is a Category I installation. Category I installations are required to develop an INRMP and are defined as having natural resources requiring protection and management (AFI 32-7064). Wildlife species found at Kirtland AFB are representative of the species diversity common to the regional ecosystem (grassland, juniper woodland, pinyon-juniper woodland, and ponderosa pine woodlands) and species common to semi-developed grassland areas. Examples of this species diversification include Gunnison's prairie dog, black-tailed jackrabbit, coyote, bobcat, mule deer, black bear, red-tailed hawk, western burrowing owl, northern mocking bird, canyon towhee, bull snake, western diamondback rattlesnake, and spadefoot toads. Fish habitat on base is limited to the man-made ponds located at the Tijeras Arroyo Golf Course. Several small wetlands on base provide a unique habitat in an otherwise arid environment. These wetlands provide a water resource for the local wildlife as well as breeding sites for local amphibians such as the tiger salamander and red-spotted toad.

Natural resource personnel provide technical support to the 377 ABW and associate organizations for all wildlife related concerns. Fish and wildlife program management on Kirtland AFB has been largely directed by the 2001 INRMP. Various plans and programs have been developed/implemented including prairie dog relocation, plant and wildlife inventories, burrowing owl monitoring, loggerhead shrike survey, and habitat improvements such as the construction of raptor nesting platforms and wetland restoration. Specific plans, reports and programs resulting from implementation of the 2001 INRMP can be found in Appendix A. Kirtland AFB has been identified as an Important Bird Area by Partners in Flight due to the large urban colony of burrowing owls that nest on base. Hunting, trapping, and fishing are not allowed on the base, as these activities would conflict with mission objectives.

Kirtland AFB works cooperatively with other agencies on an as-needed basis including the USFWS, NMDG&F, USFS, and the USACE. Since Kirtland AFB is a closed base, enforcement of wildlife laws are not a routine part of the security forces on base. In the event that wildlife laws are violated, appropriate local, state, and federal authorities are contacted to deal with the matter.

Issues:

- Long-term monitoring of birds, bats, predators, reptiles, and amphibians have not been done for the base.
- Free standing water for wildlife is limited on base, thus restricting species distributions.
- Power lines pose an electrocution risk to raptors and have not been raptor proofed.
- Prairie dogs continue to occupy areas identified as prairie dog exclusion zones.
- Kirtland AFB vegetation manual does not include all species occurring on base.

- Communication between the DOE and DOD needs to continue, otherwise natural resource management would be negatively affected.

7.4 MANAGEMENT OF THREATENED AND ENDANGERED SPECIES AND HABITATS

Past T&E species surveys have only revealed the presence of one federally or state listed species, the state threatened gray vireo. A survey conducted in 2003 revealed 53 gray vireo territories occurring in juniper woodland habitat (Appendix C). Another survey was completed in 2005 that focused on brown-headed cowbird nest parasitism on the gray vireo (Appendix C). Any proposed thinning treatments of pinyon-juniper stands for habitat improvement for the state-listed gray vireo will be coordinated with the NMDG&F's Conservation Services Division of the Santa Fe office.

The western burrowing owl, loggerhead shrike, and mountain plover, are federal species of concern that are either found on or near Kirtland AFB. Monitoring of the burrowing owl is done annually to determine populations, breeding success, and habitat use. A migration study is also being performed to determine where these owls winter. Loggerhead shrikes are relatively common on base and currently surveys are being done on base to determine its distribution. Mountain plovers, a former federal candidate species, have not currently been found on Kirtland AFB, but may potentially be found in the southern grasslands of the base. A 2003 survey for this species revealed its presence on the Isleta Pueblo. A mountain plover with chicks was observed approximately 50 meters south of the base (Appendix C).

Issues:

- Mountain plovers, a former federal candidate species, may potentially be found in the southern grasslands of the base.
- Long-term monitoring of the gray vireo has not been done, nor has a management plan been developed for this species.
- Habitat improvements for the gray vireo have not been performed.
- Gray vireos are nest parasitized by brown-headed cowbirds.
- Long-term monitoring of the loggerhead shrike has not been performed.
- The western burrowing owl population at Kirtland AFB has declined over the past several years. Reasons for the decline are not clearly understood, although vandalism and harassment of nests during the nesting season is of concern. A management plan has not been developed for this species.
- Military construction occasionally disturbs nesting burrowing owls.

7.5 WATER RESOURCE PROTECTION

Kirtland AFB has a Storm Water Pollution Prevention Plan (2006) that protects surface and ground water from pollution issues associated with runoff from the base.

7.5.1 Floodplains

Flooding on Kirtland AFB generally occurs between May and October during high-intensity thunderstorms (USACE 1979b). Tijeras Arroyo and Arroyo del Coyote floods are characterized by high peak flows, small volumes, and short duration. Although flooding occurs infrequently, vegetation can encroach into the arroyos' channels, obstructing the flow of water and causing flooding. A 100-year floodplain encompasses these arroyos and follows their path.

7.5.2 Groundwater

Kirtland AFB is located within the limits of the Rio Grande Underground Water Basin, which has been defined by the State of New Mexico as a natural resource area and has been designated as a "declared underground water basin." The state regulates it as a sole source of potable water. The average depth to groundwater beneath Kirtland AFB is 450 to 550 feet. The Rio Grande Basin's source of groundwater is the Santa Fe Aquifer. The volume of recoverable fresh groundwater in the Rio Grande Basin is estimated at 2.3 billion-acre feet.

Albuquerque relies on groundwater as its sole potable water source. The municipal water system of Albuquerque has a total city system capacity of 289 million gallons per day; the current city usage is less than 40 percent of the total city system capacity. A localized change in the direction of flow of the regional groundwater flow beneath Kirtland AFB has occurred towards Albuquerque because of Albuquerque's extensive water pumping. Recharge of the Santa Fe Aquifer is most likely to occur east of the installation in the Manzanita Mountains where the sediment material favors rapid infiltration (USAF 1991).

The USGS performed a study in 1993-1994 to provide an understanding of the Albuquerque basin groundwater supply. Public supply, industrial, and military requirements (Kirtland AFB) in the Albuquerque area are primarily met by groundwater supply. Recent studies indicate that the most productive zone of the aquifer system is much less extensive than was formerly assumed. Water level declines, greater than those predicted by hydrologic investigations in the early 1960s have occurred in the basin. The City of Albuquerque Water Conservation Office (CAWCO) cites the USGS 1993 study and notes that non-pumping water levels in production wells in Albuquerque have dropped as much as 160 feet since 1960 (CAWCO 1997). In the fall of 1994 the city developed a comprehensive water policy that targets a 30 percent reduction in use through conservation. This plan was adopted in March 1995 with a goal of reducing water use per person by 30 percent from 250 to 175 gallons per day by 2004 (CAWCO 1998).

Issues:

- Use of herbicides and fertilizers on grounds could affect water resources if used excessively.
- Floodplains may be affected by vegetation, especially tamarisk that has encroached into arroyo channels.

7.6 WETLAND PROTECTION

Wetlands have been defined as areas that are "inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE 1987). Wetlands are considered waters of the U.S. if the wetland is located "adjacent" (generally within 500 feet) to or are part of tidal waters, navigable waterways, lakes, rivers, streams, intermittent streams, mudflats, sloughs, wet meadows, natural ponds, playa lakes, and other wetlands. For regulatory purposes, wetlands are defined by three factors: vegetation, hydrologic regime, and soil characteristics. The USACE Wetland Delineation Manual is the governing guide to wetland identification.

The USACE, U.S. Environmental Protection Agency (EPA), and the USFWS regulate activities, which impact wetland resources. The USACE and EPA regulate and permit dredge and fill activities within the waters of the U.S., including wetlands under the authority of Section 404 of the Clan Water Act. The USFWS reviews and provides input to the permit applications.

Most of the small, scattered wetlands on Kirtland AFB are in good condition and occur in conjunction with other plant communities. For the most part, these wetlands provide very little in the way of habitat other than they provide a reliable source of water in an otherwise arid environment.

The Coyote Springs wetland complex, which is comprised of several springs and seeps, covers an area of approximately one acre. This area has been used extensively over the years. A hotel was built at the springs in the mid 1800's. In the 1880's the Coyote Springs Mineral Water Company bottled water from the springs. Beginning around the 1960's through the late 1990's the area was used as a recreational area for military personnel. Over the last five years, several restoration and enhancement projects have been undertaken at the Coyote Springs wetland complex. Beginning in December 2000, selected dead trees, numerous concrete slabs, barbeque pits, tables, benches, rubble piles, metal racks and trash were removed. Then a large salt cedar stand was cut and removed from Arroyo del Coyote. Currently, an enhancement project is underway involving the construction, lining, filling and vegetating of a small pond in the complex as well as removing the salt cedar stand. A security gate has also been constructed to prevent access to the restoration area.

Issues:

- Restoration of the Coyote Springs wetland complex is not complete.
- Changes to the Coyote Springs wetland complex and an undocumented wetland located southwest of Coyote Springs have made the USACE wetland delineation for the base outdated.
- A comprehensive inventory of the flora and fauna of the bases wetlands have not been done for the base. As a result, long-term monitoring has also not been performed.

7.7 GROUNDS MAINTENANCE

Land Management and Grounds Maintenance are maintained by Chugach Management Services, Joint Venture and the 377th Civil Engineer Squadron. Land management and grounds maintenance planning on Kirtland AFB is conducted to protect and preserve natural and manmade resources on the installation. Land classifications include:

- **Improved Grounds**: Grounds maintained as high quality lawn with no more than 2 to 4 inches of length. Improved grounds are free of bald spots, weeds, dead patches, raked, leafless, and without trash. All edges are neat and swept. Areas include the developed area, parade grounds, drill fields, athletic areas, golf courses (excluding roughs), cemeteries, and housing areas.
- **Semi-Improved Grounds**: Grounds maintained as grass ground cover with no more than 5 to 10 inches of length. These areas are mowed less often. They are raked, leafless, and without trash. Areas include those where periodic maintenance is performed and areas adjacent to runways, taxiways, and aprons; runway clear zones; lateral safety zones; rifle and pistol ranges; weapons firing and bombing ranges; picnic areas; ammunition storage areas; antenna facilities; and golf course roughs.
- **Unimproved Grounds**: These grounds consist of grasslands; woodlands; shrublands; lakes; ponds and wetlands; and any areas where natural vegetation is allowed to grow unimpeded by maintenance activities.

The Kirtland AFB Land Management Plan addresses land management practices that protect natural resources for and minimize impact from military activities. Current ecosystems, landscaping, irrigation, erosion and drainage issues are discussed in the plan. The USAF Landscape Design Guide also provides guidelines for landscaping while the Kirtland AFB Revegetation Manual (Appendix C) describes acceptable techniques for revegetating disturbed lands.

Urban forestry practices are utilized to ensure the health and protection of trees from pollution, vandalism, storm damage, pests and diseases. DOD natural resource managers are responsible for tree resources in developed areas. Guidelines are provided in the DOD Urban Forestry Manual.

The National Arbor Day Foundation and USDA Forest Service's Tree City USA program is a program that promotes urban and community forestry programs throughout the U.S. They provide technical assistance, guidelines, and public attention for forestry programs in cities and towns. Kirtland AFB has been designated as a Tree City USA community for five years.

Issues:

- A Golf Course Management Plan has not been developed.
- The Revegetation Action Plan, Land Management Plan, and Brush Control Plan will need to be reviewed. These plans were written in 2004 and need to be updated in 2009.

- Natural resource conditions on base have changed since the 2001 Baseline Natural Resources Inventory was completed, thus making it outdated.
- Long-term documentation of changes in landscapes, vegetation, and other natural resources has not been performed by the base.

7.8 FOREST MANAGEMENT

Currently, 15,891 acres of CNF are within the Kirtland AFB Withdrawal Area, this does not include DOE withdrawn lands, and is part of the Sandia District. The Sandia District manages this area under their *Ecosystem Management Plan for National Forest Systems Lands In and Adjacent to the Military Withdrawal*. The land was withdrawn from public use by a series of Public Land orders beginning in the 1940s (Kirtland AFB 2004d). Kirtland AFB utilizes the CNF Land Management Guidelines and the USFS minimum standards, guidelines, and policies in forest management practices. The USAF is responsible for construction and maintenance of all roads, trails, pads, ramps, experimental sites, and storage or auxiliary areas. The area is currently unavailable for routine forest management activities but the USFS has timber management rights and responsibilities (USDA 1985). There are no commercial forestry operations on base.

Forest types found on the installation are predominately pinyon-juniper woodland. Other types include ponderosa pine woodland (lower southeast corner), mixed conifer, juniper woodland (far western portion), grassland meadows and mountain shrub.

Existing forest access trails and roads include 14.5 miles of trail and 55.1 miles of roads within the Kirtland AFB Withdrawal Area. Many of these roads have been identified as candidates for closure, obliteration, or rehabilitation.

USFS management guidelines and forest management include reforestation, brush control, protection of riparian areas, and seeding barren areas. The CNF land management practices that can be utilized by Kirtland AFB and can go towards achieving INRMP goals include:

- Reforestation for mixed conifer and ponderosa pine
- Brush control within pinyon-juniper, grasslands, mountain shrub, and ponderosa pine communities could use mechanical treatments to reestablish ecosystems
- Thinning of woodland overstory in pinyon-juniper habitat utilizing mechanical treatments and firewood harvest.
- Planting riparian-dependent species to protect riparian areas. Utilizing protective fencing to reduce future impacts from wildlife, persons or vehicles.
- Barren areas, primarily old dirt roads no longer in use, could be pitted and seeded to increase ground cover and reduce soil loss.

Issues:

- Communication between Kirtland AFB and the Sandia Ranger district needs improvement (i.e., access to Withdrawal Area via locked gates).
- Fuels such as dense trees and brush have been allowed to increase (see Wildland Fire Management, Section 7.9)

7.9 WILDLAND FIRE MANAGEMENT

Fire is a natural part of an ecosystem, which has shaped the composition of regional plants and animals. Fire has the potential to set back ecological succession and create a mosaic of habitat that supports a diverse assemblage of plants and animals. Kirtland AFB contains over 52,000 acres, most of which can be categorized as unimproved lands. A draft Wildland Fire Management Plan has been developed for the base. Wildfires on base are controlled by Kirtland AFB Fire Department.

Wildlife suppression on base has lead to a heavy fuel load, especially in the withdrawn lands portion of the base. The 1941 East Mountain Complex Fire, reduced fuel loads on base to an average of 20 percent. While wildfires that have occurred on base since 1941 have been relatively infrequent, they have been suppressed immediately. By 2001, the estimated fuel load had reached 90 percent capacity. Due to the high fuel loads, mechanical methods are being suggested as a means to reduce fuel densities in several areas, including the Withdrawal Area.

Issues:

- The draft Wildland Fire Management Plan has not been implemented. As a result, fuels have been allowed to accumulate, increasing the risk of wildfires.

7.10 INTEGRATED PEST MANAGEMENT PROGRAM

The Pest Management Program at Kirtland AFB is concerned with preventing pests and disease from adversely affecting the military mission and operation of the base. The Pest Management Plan is managed by the 377th Mission Support Group Civil Engineer Division and Chugach Management Services, Joint Venture. The Golf Course Management Plan describes how pests associated with the golf course are managed, while the Prairie Dog Management Plan addresses prairie dogs. The Prairie Dog Management Plan provides both lethal and non-lethal (relocation) alternatives. The U.S. EPA and the DOD agreed in a MOU in 1996 to reduce human exposure and environmental impacts to pesticide use. Kirtland AFB's goal has been to reduce pesticide use by 50 percent from 1993 baseline usage and has been continuing to find alternatives to reduce chemical use.

Pests such as insects, birds and mammals may carry diseases such as the plague, hantavirus, rabies, west nile virus, and bacterial and fungal diseases. Kirtland's Pest Management Plan identifies pests by category and control methods including: 1) *indirect strategies* such as proper ways to store food, sealing cracks, removing woodpiles, stones, trash and debris etc; 2) mechanical controls such as removing branches or weeds; 3) *physical controls* such as using water, soaps or detergents to remove pests; 4) *biological controls* such as using predators, and 5) *chemical controls* that involve the use of insecticides, pesticides and herbicides. Pests identified in the Pest Management Plan include the following:

1) *General household and nuisance pests*. These pests include ants, yellow jackets, hornets, wasps, cockroaches, spiders, ticks, silverfish, firebrats, scorpions, centipedes, millipedes, clover mites, crickets, earwigs and fleas.
2) *Structural pests*. These pests include termites and carpenter ants.
3) *Stored product pests*. These include lesser grain borer and the Mediterranean flour moth
4) *Weed control*. Weeds that are frequently encountered on base include Dallas grass, crabgrass, Bermuda grass, Johnson grass, yellow foxtail, green foxtail, annual bluegrass, puncture vine, Russian thistle, broadleaf plantain, dandelion, annual sowthistle and redroot pigweed.
5) *Pests of ornamental plants and turf*. These pests infect trees and other plants on base and are mostly monitored for natural controls. Horticulture methods may be used such as pruning leaves and stems from infected trees and using nitrogen fertilizer. Pests include the Elm leaf beetle, scale, fall webworm, tent caterpillar, sod webworms, and white grubs.
6) *Golf course pests*. Mosquitoes represent a particular problem on the Golf Course and are controlled through physical, biological and chemical means. Other Golf Course pests include coontail, anthracnose foliar blight, gray snow mold or typhula blight, puncture vines, broadleaf plantain, and common mallow.
7) *Miscellaneous pests*. These pests include rodents such as mice or rates. Steps used to control rodents involve inspection, sanitation, exclusion and reduction. Other miscellaneous pests include prairie dogs, pocket gophers and skunks. Control of these pests usually involves indirect strategies, physical and chemical controls.

Issues:

- Prairie dogs continue to inhabit areas of the base where they pose a health and safety risk, cause damage, or interfere with the military mission.
- Pigeon's loaf and nest on hangers causing a health concern from their accumulated droppings.
- A noxious week inventory for the base has not been completed. As a result, no weed management plan has been written.

7.11 BIRD/AIRCRAFT STRIKE HAZARD (BASH)

The Kirtland AFB BASH Plan identifies procedures to decrease the potential for bird and wildlife aircraft strike hazards. The 58 SOW Flight Safety is responsible for the BASH Plan. Existing conditions include flying areas that are located near a major migratory flyway along the Rio Grande River. BASH incidences at Kirtland AFB are currently very low but migratory birds and other wildlife hazards do exist. The Bird Hazard Working Group was established to coordinate activities for all agencies involved in the BASH Program and includes representatives from flight safety, airfield management, CE, natural resource representatives, and the New Mexico Civil Air Patrol Liaison.

The 377 ABW/CE uses land management practices such as pruning trees and other vegetation management to make the airfield less attractive to birds and wildlife. Pest Management Program practices are also utilized to control pests on and around the airfield to reduce BASH hazards.

The largest threat to flying units on Kirtland AFB are migratory and non-migratory birds such as migrating waterfowl (ducks, geese, swans), raptors (hawks, falcons, kites, eagles, vultures), cranes, pigeons and doves, owls, horned larks, swallows and pratincoles, crows and ravens, blackbirds, grackles, cowbirds and starlings, meadowlarks, house sparrows, warblers and fringillids (sparrows, finches, grosbeaks and buntings). Other wildlife including coyotes, rabbits and prairie dogs also pose a threat.

Issues:

- Prairie dogs continue to be a problem near the airfield adding to the BASH potential.
- Tall vegetation around the airfield can attract raptors and other wildlife which lead to an increase in the BASH potential.

7.12 OUTDOOR RECREATION

The Sikes Act requires military installations to promote public use of outdoor recreational resources that do not conflict with the installation mission. Outdoor recreation activities are grouped into three classes:

- **Class I – Developed Recreation Areas**: Areas that are suitable for recreational activities such as sport fields, campgrounds, picnic areas, paved walking/jogging/cycling trails, winter sports and water sports.
- **Class II – Dispersed Recreation Areas**: These areas include hunting, fishing, bird watching, boating, hiking and sightseeing.
- **Class III – Special Interest Areas**: These areas may contain valuable archeological, botanical, ecological, geological, historic, zoological, scenic or other features that require protection and access control.

Outdoor recreation is managed by the 377th Services Squadron. Outdoor recreational areas on Kirtland AFB consist of all three classes. Class I and II recreational areas on the base include softball, football and soccer athletic fields, tennis courts, three parks, three picnic areas, an outdoor swimming pool, a 5-acre family camping area with 55 sites, an 18-hole golf course, riding stables and a 14-mile trail around Manzano base, archery range, hiking around Manzano Base, and jogging track. Fishing and hunting are not allowed on Kirtland AFB.

Class III areas include archaeological sites (302 have been identified on base but only some are eligible or have been added to the National Register), 17 historical buildings, a scenic lookout at the fire tower and wetland springs.

Off-road vehicles used to be allowed on a 120-acre off road area but has since been closed.

Issues:

- Base personnel who recreate on the base often do so in areas that conflict with the military mission.

7.13 CULTURAL RESOURCES PROTECTION

There are 661 archeological sites located on Kirtland AFB land, all of which receive some form of protection. Of the 661 archaeological sites on Kirtland AFB, 251 are eligible to the National Register of Historic Preservation, 237 are not eligible and therefore are not significant resources for Kirtland AFB to protect, and 173 are currently being evaluated for eligibility. Sites include historic buildings, structures, and sites dating from European contact, ca. AD 1540, through the Cold War, ca. AD 1945-1991. Prehistoric sites dating from the Paleo-Indian Period to the Pueblo Period also have been recorded.

Section 110 of the National Historic Preservation Act (NHPA) requires the Air Force to complete an inventory of historic properties located on its land (36 Code of Federal Regulations 60, 63, 78, 79, and 800). The entire base has been surveyed via a series of cultural resource studies ranging from the 1990s to 2005.

Section 106 of NHPA requires Kirtland AFB to evaluate and assess any action that could impact cultural resources prior to commencing work. Therefore, natural resource projects must go through the proper coordination to ensure no resources are adversely impacted.

Currently, there is a Cultural Resources Management Plan (July 2000) in place that inventories and protects cultural resources on Kirtland AFB. An Integrated Cultural Resources Plan (2005) has been prepared and will be in place by 2006. It is possible that not all cultural resources have been identified and that subsurface construction or ground maneuver training activities may inadvertently disturb such resources. It is also possible that natural resources management activities such as forest management (e.g. construction and maintenance of fire breaks, brush control and other forms of fire threat reduction) or revegetation of disturbed areas may reveal previously unidentified cultural resources.

Issue:

- Implementation of base programs, including natural resources, may unearth or expose previously unknown cultural resources.

7.14 ENFORCEMENT

A Natural Resources Law Enforcement program at Kirtland AFB does not currently exist. Security police at Kirtland AFB are responsible for maintaining law and order on the base.
Issues:

- Occasional trespassing from hikers, mountain bikers, horseback riders, and all terrain vehicles occurs along the eastern boundary of the Withdrawal Area.
- Mule deer, coyotes, and other wildlife are hit by vehicle traffic on base.
- Mule deer are occasionally poached on base.
- Unauthorized feeding of wildlife occurs on base conflicting with the military mission.

7.15 PUBLIC OUTREACH

Partnerships with agencies such as the NMDG&F, USFS and the USFWS currently exist with natural resources personnel at Kirtland AFB. Additionally, non-profit youth organizations provided services for the Coyote Springs Wetland Restoration Project by constructing a wildlife blind, wildlife brush piles, a walking path, an overflow rock stream bed, and planting cotton wood trees. Also, local Eagle Scouts have built burrowing owl "soft release" cages and burrowing owl nest site perches. Still, there are abundant public outreach opportunities at the base, for example, signs identifying natural resources including animals, trees and vegetation types along running trails, at the Coyote Springs wetland and in the vicinity of prairie dog colonies could be installed to educate base personnel about natural resources on base.

Issues:

- Prairie dog colonies could spread off base, causing conflicts with Kirtland AFBs neighbors.
- Various natural resource projects exist where non-profit organizations can provide support.

CHAPTER 8
MANAGEMENT GOALS AND OBJECTIVES

The natural resources management goals and objectives described in this section are based on the issues and concerns addressed in the previous chapter. Goals reflect the values of the installation by expressing a vision of a desired condition for the installation's natural resources for the period of this plan (i.e. the next five years). Each goal is supported by one or more objectives, which specifies how it will be obtained. Objectives may support more than one goal. Projects are individual work plans required to achieve an objective, which describe the specific methods, and procedures that will be used to achieve the objective.

This INRMP is focused on the achievement of ten specific goals for the protection and improvement of the natural environment at Kirtland AFB. These goals were formulated from a comprehensive analysis of regulatory requirements, the condition of the natural resources, and consideration of the value of these resources to the people who live and work on the installation.

Goal 1: Comply with the Sikes Act Improvement Act of 1997, AFI 32-7064, Integrated Natural Resources Management, as revised, Memoranda of Agreement concerning migratory bird and use of USGS land, and USAF and USFS guidelines for managing natural resources, as well as other environmental rules, regulations, laws, and procedures.

Goal 2: Manage and protect natural resources in a manor that result in no net loss of the military mission and operational capability at Kirtland AFB.

Goal 3: Conserve and enhance wildlife habitats to maintain and improve the sustainability and natural diversity of ecosystems on Kirtland AFB.

Goal 4: Identify, conserve, and manage, if present, threatened, endangered, and candidate species listed for regulatory protection by federal and state agencies, in addition to critical habitat and wetlands.

Goal 5: Manage wildlife habitat and populations to reduce the potential for bird and wildlife strikes during flying operations.

Goal 6: Develop and implement an education program for base personnel and the public to increase the awareness, appreciation and conservation of natural resources on Kirtland AFB.

Goal 7: Manage pest in a manner that reduces impacts to natural resources, watersheds, landscapes, and the base mission.

Goal 8: Incorporate existing and future GIS information into a database that supports both mission and project planning and Natural Resources Management Program activities.

Goal 9: Support resource conservation through integrated land and ground maintenance programs and plans, when and where possible.

Goal 10: Provide opportunities for enjoyment and appreciation of the natural resources at the base.

Chapter 7 identified specific management issues for components of the Natural Resources Management Program. The remainder of this Chapter 8 identifies specific objectives that will be implanted to achieve the ten goals of the INRMP and address identified natural resources management issues.

Appendix A contains specific projects that will be implemented to achieve the goals and objectives set forth in this chapter. Implementation of the INRMP will ensure that Kirtland AFB continues to support, present and future, mission requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, implementation of this and future revisions of the INRMP will help guide base staff in preserving and improving the sustainability of the ecosystem at Kirtland AFB while supporting the military mission.

The following are objectives and projects to be implemented, when possible, to achieve the goals listed above. Objectives and projects may support more than one goal.

GIS

OBJECTIVES

- Promote cohesion of GIS data between different GIS departments at Kirtland AFB.

FISH AND WILDLIFE

OBJECTIVES

- Conduct a base wide bat survey, especially around wetlands and abandoned mines to determine which species are present on base.
- Implement the recently signed MOU between the DOD and Bat Conservation International.
- Use the Monitoring Avian Productivity and Survivorship Program to conduct long-term land bird surveys.
- Continue communication between the DOD, USFS and DOE concerning natural resources issues.
- Continue monitoring predator distribution and populations.
- Maintain, repair, and install wildlife guzzlers throughout the base.
- Identify power lines that pose an electrocutions risk to raptors and raptor-proof these structures.

- Survey for and update the base's reptile and amphibian inventory.
- Continue prairie dog relocation from exclusion zones to a relocation site on base.
- Update the vegetation manual for the base by conducting additional flora surveys.

THREATENED AND ENDANGERED SPECIES

OBJECTIVES

- Conduct mountain plover surveys once every five years.
- Monitor gray vireo populations on base.
- Thin out the pinyon-juniper woodland habitat on base to encourage use by the state threatened gray vireo. Proposed thinning treatments of pinyon-juniper stands for habitat improvements for the state-listed gray vireo will be coordinated with the NMDG&F's Conservation Services Division of the Santa Fe office.
- Develop and implement a Gray Vireo Management Plan.
- Monitor gray vireo nesting success and nest parasitism by brown-headed cowbirds.
- Conduct long-term monitoring of the loggerhead shrike, with emphasis on nesting success and population trends.
- Continue annual monitoring of nesting burrowing owls.
- Continue burrowing owl migration study.
- Develop and implement a Burrowing Owl Management Plan.
- Continue installing artificial burrows on base to replace burrowing owl nesting habitat that has been disturbed by development.

WATER RESOURCE PROTECTION

OBJECTIVES

- Minimize fertilizer and herbicide use on grounds.
- Remove tamarisk from arroyos and drainages.

WETLAND PROTECTION

OBJECTIVES

- Continue the wetland restoration and enhancement at the Coyote Springs wetland complex.
- Complete an update of the wetland delineation for Kirtland AFB to reflect current conditions.
- Identify the function and values, as well as inventorying the flora and fauna of the bases wetlands.
- Monitor flora and fauna at the Coyote Springs wetland complex.

GROUNDS MAINTENANCE AND LAND MANAGEMENT

OBJECTIVES

- Develop and implement a Golf Course Management Plan.
- Review and update, if conditions change, the Revegetation Action Plan.
- Review and update, if conditions change, the Land Management Plan.

- Develop a long-term photographic monitoring program that documents changes in landscape and vegetation on base.
- Review and update, if conditions change, the Brush Control Plan.
- Update the bases natural resources inventory, which delineates vegetation communities, identifies areas of erosion, identifies areas in need of revegetation, noxious weed invasions, and vegetation reconnaissance points. Integrate this information into other various management programs.
- Develop and implement a Land Condition Trend Analysis Program

FOREST MANAGEMENT

OBJECTIVES

- Continue working with the Sandia Ranger District in joint management of forests in the Withdrawal Area to restore conditions and reduce fuels loads.

WILDLAND FIRE MANAGEMENT

OBJECTIVES

- Finalize and implement the Wildland Fire Management Plan.

INTEGRATED PEST MANAGEMENT PROGRAM

OBJECTIVES

- Continue to manage prairie dog populations on base to minimize BASH potential, damage to infrastructure, and health and safety concerns by following the procedures outlined in Kirtland AFBs Prairie Dog Management and Relocation Plan.
- Develop and implement a Pigeon Management Plan for aircraft hangers on base where pigeons are causing health concerns.
- Survey for noxious weeds and develop a management plan.

BIRD/AIRCRAFT STRIKE HAZARD

OBJECTIVES

- Continue to monitor and remove prairie dogs around flight lines to reduce foraging raptors in the area.
- Maintain the mowing program around flight lines in order to reduce attracting prey species for raptors and other wildlife.

OUTDOOR RECREATION

OBJECTIVES

- Implement a program on base that educates personnel where recreation activities such as horseback riding, mountain biking, and running are allowed, to prevent conflicts with military missions and incidents with UXO.

CULTURAL RESOURCES PROTECTION

OBJECTIVES

- Maintain communication between cultural and natural resource personnel to ensure protection of cultural resources discovered during INRMP implementation.

ENFORCEMENT

OBJECTIVES

- Ensure that Kirtland AFB security personnel, DOE security personnel, and the NMDG&F work together when poaching of deer or collision with vehicles occur on base.
- Continue to patrol the Withdrawal Area for trespassers.
- Ensure that new security personnel are aware that unauthorized feeding of wildlife is prohibited on base.

PUBLIC OUTREACH

OBJECTIVES

- Prevent spread of prairie dog colonies off Kirtland AFB.
- Organize conservation project with non-profit organizations such as Scout Troops and the Youth Conservation Corp.

CHAPTER 9
IMPLEMENTATION

The Sikes Act, as amended, requires the preparation and implementation of an INRMP on military installations. This INRMP is a five-year rewrite and revision of the 2001 INRMP as directed by AFI 32-7064. This INRMP will be implemented by actions to achieve the goals and objectives stated in Chapter 8, and will result in no net loss of the military mission or operational capability. Projects, focused on the accomplishment of these goals and objectives, will form the foundation for budget request. As the INRMP is implemented, NEPA compliance for projects will be assured through appropriate analysis pursuant to AFI 32-7071, including CATEXs, EAs, or EISs.

Work plans are presented in Appendix A. These plans are separated by resource area and indicate the goal and objective being meet, as well as a project description. The work plan provides the necessary information for building a budget within the Air Force framework by including a timeframe and estimated cost. Projects have been given a Priority of 1-3. Priority 1 projects are the most critical to the military mission, therefore funding for these projects will be requested first. As Priority 1 projects are completed, funding for less critical projects (i.e. Priority 2 and Priority 3), will be requested next. Projects may be accomplished by contractors, in-house staff, volunteers, or through cooperative agreements with state and federal agencies or other private organizations. The Air Force programming procedures will be followed by Kirtland AFB to request funding for these projects. Base organizations responsible for implementing each of these projects are identified in the work plans. Currently, there are no known staffing deficiencies and training needs that would affect the implementation of this INRMP.

As required by AFI 32-7064, annual review and updates of this INRMP are required by Kirtland AFB, USFWS, NMDG&F, and the Sandia Ranger District. Kirtland AFB will be responsible for informing each of these cooperating agencies about the progress, successes and/or issues with the implementation of this INRMP. Monitoring the implementation of this INRMP will note which projects have been completed, which ones are ongoing, which ones have had funding requested, and which ones have not been implemented to date. Table 9-1 is a shortened version of Appendix A and can be used as a quick reference during the annual review. A brief annual summary of the success, progress, and/or issues resulting from monitoring the implementation of this INRMP will be sent to each of the cooperating agencies. Each agency will then send a formal response to Kirtland AFB. These annual agency coordination and review letters will be kept in Appendix H of this INRMP. Any issues that arise will be addressed in a timely manner with all affected agencies getting involved.

Table 9-1. Integrated Natural Resource Management Plan Implementation

INRMP Objectives/Projects	Priority (1-2)	Lead Organization
Geographic Information System		
Promote cohesion of GIS date between different GIS departments at Kirtland AFB.	2	377 MSG/CEVQ
Fish and Wildlife		
Conduct a base wide bat survey, especially around wetlands and abandoned mines to determine which species are present on base.	1	377 MSG/CEVQ
Implement the recently signed MOU between the DOD and Bat Conservation International.	2	377 MSG/CEVQ
Use the Monitoring Avian Productivity and Survivorship Program to conduct long-term land bird surveys.	1	377 MSG/CEVQ
Continue communication between the DOD and DOE concerning natural resources issues.	2	377 MSG/CEVQ
Continue monitoring predator distribution and populations.	1	377 MSG/CEVQ
Maintain, repair, and install wildlife guzzlers throughout the base.	2	377 MSG/CEVQ
Identify power lines that pose an electrocutions risk to raptors and raptor-proof these structures.	1	377 MSG/CEVQ
Survey for and update the bases reptile and amphibian inventory.	1	377 MSG/CEVQ
Continue prairie dog relocation from exclusion zones to a relocation site on base.	1	377 MSG/CEVQ
Update the vegetation manual for the base by conducting additional flora surveys.	1	377 MSG/CEVQ
Threatened and Endangered Species		
Conduct mountain plover's surveys once every five years.	1	377 MSG/CEVQ
Monitor gray vireo populations on base.	1	377 MSG/CEVQ
Thin out the pinyon-juniper woodland habitat on base to encourage use by the state threatened gray vireo (Any proposed thinning treatments of pinyon-juniper stands for habitat improvements for the state-listed gray vireo will be coordinated with the NMDG&F's Conservation Services Division of the Santa Fe office.)	1	377 MSG/CEVQ
Develop and implement a Gray Vireo Management Plan	1	377 MSG/CEVQ
Monitor gray vireo nesting success and nest parasitism by brown-headed cowbirds.	1	377 MSG/CEVQ
Conduct long-term monitoring of the loggerhead shrike, with emphasis on nesting success and population trends.	1	377 MSG/CEVQ
Continue Kirtland AFBs burrowing owl migration study.	1	377 MSG/CEVQ
Develop and implement a Burrowing Owl Management Plan	1	377 MSG/CEVQ
Continue annual monitoring of nesting burrowing owls.	1	377 MSG/CEVQ
Continue installing artificial burrows on base to replace burrowing owl nesting habitat that has been disturbed by development.	1	377 MSG/CEVQ

Table 9-1. Integrated Natural Resource Management Plan Implementation

INRMP Objectives/Projects	Priority (1-2)	Lead Organization
Water Resource Protection		
Minimize fertilizer and herbicide use on grounds.	1	377 CES/CEO
Remove tamarisk from arroyos and drainages	1	377 MSG/CEVQ
Wetland Protection		
Continue the wetland restoration and enhancement at the Coyote Springs wetland complex.	1	377 MSG/CEVQ
Complete an update of the wetland delineation for Kirtland AFB to reflect current conditions.	1	377 MSG/CEVQ
Identify the function and values, as well as inventorying the flora and fauna of the bases wetlands.	1	377 MSG/CEVQ
Monitor flora and fauna at the Coyote Springs wetland complex.	1	377 MSG/CEVQ
Grounds Maintenance and Land Management		
Develop and implement a Golf Course Management Plan.	1	Base Parks and Recreation
Review and update, if conditions change, the Revegetation Action Plan.	1	377 MSG/CEVQ
Review and update, if conditions change, the Land Management Plan.	1	377 MSG/CEVQ
Develop a long-term photographic monitoring program that documents changes in landscape and vegetation on base.	1	377 MSG/CEVQ
Review and update if conditions change, the Brush Control Plan.	1	377 MSG/CEVQ
Update the bases natural resources inventory, which delineates vegetation communities, identifies areas of erosion, and identifies areas in need of revegetation, noxious weed invasions, and vegetation reconnaissance points. Integrate this information into other various management programs.	1	377 MSG/CEVQ
Develop and implement a Land Condition Trend Analysis program for Kirtland AFB.	1	377 MSG/CEVQ
Forest Management		
Continue working with the Sandia Ranger district in joint management of forests in the Withdrawal Area.	1	377 MSG/CEVQ
Wildland Fire Management		
Finalize and implement the Wildland Fire Management Plan.	1	377 MSG/CEVQ
Integrated Pest Management Program		
Continue to manage prairie dog populations on base to minimize BASH potential, damage to infrastructure, and health and safety concerns by following the procedures outlined in Kirtland AFBs Prairie Dog Management and Relocation Plan.	1	377 MSG/CEVQ
Develop and implement a Pigeon Management Plan for aircraft hangers on base where pigeons are causing health concerns.	1	377 MSG/CEVQ
Survey for noxious weeds and develop a management plan.	1	377 MSG/CEVQ

Table 9-1. Integrated Natural Resource Management Plan Implementation

INRMP Objectives/Projects	Priority (1-2)	Lead Organization
BASH		
Continue to monitor and remove prairie dogs around flight lines to reduce foraging raptors in the area.	1	377 MSG/CEVQ
Maintain the mowing program around flight lines in order to reduce attracting prey species for raptors and other wildlife.	1	377 MSG/CEVQ
Outdoor Recreation		
Implement a program on base that educates personnel where recreation activities such as horseback riding, mountain biking, and running are allowed, to prevent conflicts with military missions and incidents with unexploded ordnance.	2	377 MSG/CEVQ
Cultural Resources Protection		
Maintain communication between cultural and natural resource personnel to ensure protection of cultural resources discovered during INRMP implementation.	1	377 MSG/CEVQ
Enforcement		
Ensure that Kirtland AFB security personnel, DOE security personnel, and the NMDG&F work together when poaching of deer occur on base.	1	377 MSG/CEVQ
Continue to patrol the Withdrawal Area for trespassers	1	377 SFS
Ensure that new security personnel are aware that unauthorized feeding of wildlife is prohibited on base.	2	377 MSG/CEVQ
Public Outreach		
Prevent spread of prairie dog colonies off Kirtland AFB.	1	377 MSG/CEVQ
Organize conservation projects with non-profit organizations such as Scout Troops and the Youth Conservation Corp.	2	377 MSG/CEVQ

CHAPTER 10
PERSONS AND AGENCIES CONTACTED

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CHAPTER 11
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This report was prepared for and under the direction of the 377 ABW at Kirtland AFB by the LOPEZGARCIA GROUP. The members of the professional staff of the LOPEZGARCIA GROUP who participated in the development and technical review of this document are listed below.

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CHAPTER 12
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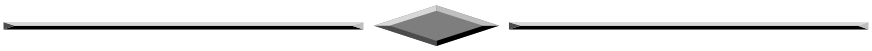
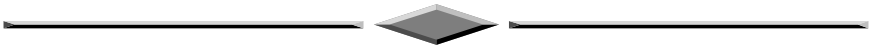


APPENDIX A
WORK PLANS



Resource Area: Geographic Information System
Objective: Promote cohesion of GIS data between different GIS departments at Kirtland AFB.
Applicable Primary Goal(s): 1, 2, and 8
Project Description: Communicate with other GIS departments about natural resource data that can be shared between departments.
Priority: 2
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: No Cost
Estimated Project Schedule: Immediately and ongoing

Resource Area: Fish and Wildlife
Objective: Conduct a base wide bat survey, especially around wetlands and abandoned mines to determine which species are present on base.
Applicable Primary Goal(s): 1, 2, 3, 4, 8, 9, and 10
Project Description: An inventory of bats on base has not been conducted. Surveys for bats may use mist nets around caves, abandoned mines, and water sources. While surveys would identify as many species as possible, special attention would be given to the spotted bat (*Euderma maculatum*), a state threatened species, and the Townsend's big-eared bat (*Plecotus townsendii pallescens*), a federal species of concern. In the event of a proposed mine closure, the mine would be surveyed for the presence/absence of bats.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: 55K
Estimated Project Schedule: 2007

Resource Area: Fish and Wildlife
Objective: Implement the recently signed MOU between the DOD and Bat Conservation International.
Applicable Primary Goal(s): 1, 2, 3, 4, 8, 9, and 10.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: 55K
Estimated Project Schedule: 2007
Project Description: The DOD recently signed (11 October 2006) a MOU with Bat Conservation International. This MOU provides cooperative coordination between these two agencies in preserving bat species on DOD lands. Kirtland AFB, to the best of its ability, shall conserve bat species on base with technical assistance, support, and training from the Bat Conservation International.
Priority: 2
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: 0-25K
Estimated Project Schedule: 2007-2011

Resource Area: Fish and Wildlife
Objective: Use the Monitoring Avian Productivity and Survivorship Program (MAPS) to conduct long-term land bird surveys.
Applicable Primary Goal(s): 1, 2, 4, and 8
Project Description: Long-term land bird studies have not been conducted by Kirtland AFB. Monitoring avian species would assist natural resource managers in identifying changes to species composition on base from military operations and from successional changes in the environment. The MAPS bird survey protocol would be used in this project. Once sites (stations) have been chosen, a series of 10 mist nets are set up in an 8-acre area, and worked for six hours (starting at sunrise). Captured birds are banded, recorded and released. This is repeated once every ten day period. Data sheets are kept, documenting recaptured birds, age, sex, species, etc with this information being sent into the Institute for Bird Populations. This type of project requires 10-20 years before any trend analysis can be performed.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: 10k per station
Estimated Project Schedule: Annually starting in 2007

Resource Area: Fish and Wildlife
Objective: Continue communication between the DOD and DOE concerning natural resources issues.
Applicable Primary Goal(s): 1, 2, 3, 4, and 10
Project Description: Currently, DOD and DOE natural resource personnel meet once a month to discuss natural resource issues and share relevant information. Ensure that open communication continues.
Priority: 2
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: No Cost
Estimated Project Schedule: Immediately and ongoing

Resource Area: Fish and Wildlife
Objective: Continue monitoring predator distribution and populations.
Applicable Primary Goal(s): 1, 2, 3, and 8
Project Description: A variety of predators occur on Kirtland AFB including mountain lion, bobcat, bear, ringtail cat, skunks, badgers, foxes, and coyotes. Knowing the distribution of these predators would assist natural resource personnel in managing this species. Methods for surveying predator distribution and populations include remote sensing camera stations, scent tracking stations, scat transects, and predator calling.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $65K
Estimated Project Schedule: 2006-2009

Resource Area: Fish and Wildlife
Objective: Maintain, repair, and install wildlife guzzlers throughout the base.
Applicable Primary Goal(s): 1, 2, 3, and 10
Project Description: Maintain and repair wildlife guzzlers on base on an as needed basis. Install wildlife guzzlers on base in areas that lack free standing water for much of the year.
Priority: 2
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $12k for each new guzzler installed
Estimated Project Schedule: As needed

Resource Area: Fish and Wildlife
Objective: Identify power lines that pose an electrocutions risk to raptors and raptor-proof these structures.
Applicable Primary Goal(s): 1, 2, 4, and 8
Project Description: A qualified raptor biologist would identify power poles on base that pose an electrocution risk to raptors. These poles would then be fitted with raptor-proofing structures to prevent raptors from perching on them.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $65k
Estimated Project Schedule: 2007-2008

Resource Area: Fish and Wildlife
Objective: Survey for and update the bases reptile and amphibian inventory.
Applicable Primary Goal(s): 1, 2, 3, 4, and 8
Project Description: Two reptile and amphibian surveys have been completed for the base. However, due to the secretive nature of many of these species, only a single specimen has been documented for some species. Other species such as the plains black-headed (none have been documented on base), are relatively common in the area but are generally found only under specific environmental conditions. Therefore multiple surveys are required to understand species occurrences and distribution in an area. Survey methods would include surveying roads, searching under appropriate structures, drift fencing, dip netting, and audible surveys for croaking toads/frogs at breeding pools.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $35K
Estimated Project Schedule: 2007

Resource Area: Fish and Wildlife
Objective: Continue prairie dog relocation from exclusion zones to a relocation site on base.
Applicable Primary Goal(s): 1, 2, 4, 5, 6, 7, 9, and 10
Project Description: A prairie dog relocation program has been developed for the base. Capture of prairie dogs will continue from exclusion zones, as identified in the plan, to a relocation site on base. The protocol established in the relocation program will be followed.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: No Cost (To be completed in house)
Estimated Project Schedule: Immediate and ongoing

Resource Area: Fish and Wildlife
Objective: Update the vegetation manual for the base by conducting additional flora surveys.
Applicable Primary Goal(s): 1, 2, 4, 6, 8, and 9
Project Description: Update the 2004 Kirtland AFB Vegetation Manual. Digital photographs of new species not already covered in the manual shall be taken. New plant species need to be identified and described as in the current manual.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $35k
Estimated Project Schedule: 2007-2008

Resource Area: Threatened and Endangered Species
Objective: Conduct mountain plover's surveys once every five years.
Applicable Primary Goal(s): 1, 2, 3, 4, and 8
Project Description: Mountain plovers have recently been observed south of the base boundary and as a result, a survey for this federal species of concern needs to be conducted. Mountain plover surveying protocol should be followed as outlined in Kirtland AFBs Work Plan for Surveying Mountain Plovers and Gray Vireo Populations.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $15K
Estimated Project Schedule: 2010

Resource Area: Threatened and Endangered Species
Objective: Monitor gray vireo populations on base.
Applicable Primary Goal(s): 1, 2, 3, 4, and 8
Project Description: Conduct a base wide gray vireo survey that identifies the total number of gray vireo territories on base. Compare the results with the 2003 survey results to identify if the population on base has decreased, increased or is stabilized. Gray vireo surveying protocol should be followed as outlined in Kirtland AFBs Work Plan for Surveying Mountain Plovers and Gray Vireo Populations.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $60K
Estimated Project Schedule: 2008

Resource Area: Threatened and Endangered Species
Objective: Thin out the pinyon-juniper woodland habitat on base to encourage use by the state threatened grey vireo.
Applicable Primary Goal(s): 1, 2, 3, and 4
Project Description: The Gray Vireo Management Plan will outline procedures for enhancing habitat for this species. When the plan is complete it will include procedures for thinning pinyon-juniper woodlands to promote use by gray vireos. Proposed thinning treatments of pinyon-juniper stands for habitat improvements for the state-listed gray vireo will be coordinated with the NMDG&F's Conservation Services Division of the Santa Fe office. This project would thus implement these habitat alteration procedures.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $66K per year on an as needed basis
Estimated Project Schedule: 2006-2011

Resource Area: Threatened and Endangered Species
Objective: Develop and implement a Gray Vireo Management Plan.
Applicable Primary Goal(s): 1, 2, 3, 4, and 8
Project Description: This plan shall outline surveying procedures for the gray vireo as well as timelines for the surveys. Two types of gray vireo surveys will be discussed. The first is a base wide inventory and the other is a nesting success/brown-headed cowbird nest parasitism survey. The management plan will identify gray vireo management goals and objectives as well as control measures for the brown-headed cowbird should control become necessary.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $35k
Estimated Project Schedule: 2006

Resource Area: Threatened and Endangered Species
Objective: Monitor gray vireo nesting success and nest parasitism by brown-headed cowbirds.
Applicable Primary Goal(s): 1, 2, 3, 4, and 8
Project Description: Monitor gray vireo nesting success and nest parasitism by brown-headed cowbirds in the Arroyo del Coyote watershed within the Withdrawal Area. Gray Vireo surveying protocol should be followed as outlined in Kirtland AFBs 2005 Final Surveying Report for Mountain Plover and Gray Vireo Populations. Field efforts shall focus on nesting success and brown-headed cowbird nest parasitism.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $55K
Estimated Project Schedule: 2006-2011

Resource Area: Threatened and Endangered Species
Objective: Conduct long-term monitoring of the loggerhead shrike, with emphasis on nesting success and population trends.
Applicable Primary Goal(s): 1, 2, 3, 4, and 8
Project Description: Long-term monitoring of the loggerhead shrike has not been done on base. Monitoring shall document shrike populations, habitat use, and nesting success, while using appropriate surveying protocols.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $60K
Estimated Project Schedule: 2007-2011

Resource Area: Threatened and Endangered Species
Objective: Continue Kirtland AFBs burrowing owl migration study.
Applicable Primary Goal(s): 1, 2, 3, 4, and 8
Project Description: The nesting burrowing owl population at Kirtland AFB has been in steady decline for the past several years. A migration study has been initiated to determine where owls that nest on Kirtland AFB go to winter. Results of this study may identify reasons for the decline such as habitat destruction, illegal shooting, drought, or other human cause or natural events.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $110K
Estimated Project Schedule: 2006-2011

Resource Area: Threatened and Endangered Species
Objective: Develop and implement a burrowing owl management plan.
Applicable Primary Goal(s): 1, 2, 3, 4, and 8
Project Description: This plan shall outline goals and objectives for maintaining a burrowing owl population on Kirtland AFB. It should include, surveying protocols, schedules, identify areas important to nesting burrowing owls, procedures for constructing artificial burrows, and other burrowing owl management procedures.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $35K
Estimated Project Schedule: 2007

Resource Area: Threatened and Endangered Species
Objective: Continue annual monitoring of nesting burrowing owls.
Applicable Primary Goal(s): 1, 2, 3, 4, and 8
Project Description: Kirtland AFB has monitored burrowing owl nesting success on base for the past several years. This monitoring program has shown a decrease in the nesting owl population on base. Therefore, continued monitoring is necessary to determine if the mission at Kirtland is causing the decline, some other environmental factor is to blame or a combination of both. This project requires biologist to survey for nesting burrowing owls on base throughout suitable habitat and determine nesting success, trapping and banding of owls, prey availability, and dispersal behavior. The protocols for this type of survey have been successful on base and as a result the same procedures will continue.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $55K
Estimated Project Schedule: 2006-2011

Resource Area: Threatened and Endangered Species
Objective: Continue installing artificial burrows on base to replace burrowing owl nesting habitat that has been disturbed by development.
Applicable Primary Goal(s): 1, 2, 3, 4, and 5
Project Description: Continue installing artificial burrows on base to replace burrowing owl nesting habitat that has been disturbed by development.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $15K a year
Estimated Project Schedule: 2006-2011

Resource Area: Threatened and Endangered Species
Objective: Conduct long-term monitoring of the desert massasauga with emphasis on distribution on base and population trends.
Applicable Primary Goal(s): 1, 2, 3, 4, and 8
Project Description: The desert massasauga, designated as a species at risk, is known to occur in Kirtland AFB's grasslands. However, long-term monitoring for this species has not been done on base. Biologist would capture the desert massasauga using a variety of proven techniques and mark individuals using PIT-Tags. Using a PIT-Tag reader, recaptured individuals can be identified and appropriate data recorded. This data can then be used to help determine the species distribution, estimated population, home ranges, and other pertinent information.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $40K per year
Estimated Project Schedule: 2008 through 2011

Resource Area: Threatened and Endangered Species
Objective: Conduct long-term winter monitoring of the Ferruginous Hawk with emphasis on distribution on base, population size, winter habitat, and key prey.
Applicable Primary Goal(s): 1, 2, 3, 4, 5, and 8
Project Description: The Ferruginous Hawk, designated as a Federal species of concern, Partners in Flight Priority Bird, and a species of Management Concern, is known to occur on Kirtland AFB. However, long-term monitoring of this species has not been done on base. Biologist would trap and band the Ferruginous Hawk using established protocols and mark individuals using USFWS tarsal bands and USGS number bands. Monitoring will include identification of roosting and hunting habitat characteristics and hunting techniques and prey. This data can then be used to help determine the species distribution, estimated population, and habitat/prey requirements along with any risks to the BASH program at Kirtland AFB.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $40K
Estimated Project Schedule: 2008 through 2011

Resource Area: Water Resource Protection
Objective: Minimize fertilizer and herbicide use on grounds.
Applicable Primary Goal(s): 1, 2, and 9
Project Description: The installation will minimize fertilizer and herbicide use on improved and semi-improved grounds on base whenever possible.
Priority: 1
Office of Primary Responsibility:
Estimated Cost: No Cost
Estimated Project Schedule: Immediate and Ongoing

Resource Area: Water Resource Protection
Objective: Remove tamarisk from arroyos and drainages.
Applicable Primary Goal(s): 1, 2, 3, 7, and 8
Project Description: Tamarisk shall be removed from arroyos, drainages, and other areas of occurrences with primary focus on wetland areas. Tamarisk will be removed by spraying the affected areas at the appropriate time of year, followed by physical removal, or by other appropriate means. Protection of surrounding vegetation, especially cottonwoods, will be an important part of the eradication program at Kirtland AFB. The installation has successfully treated and removed some tamarisk stands on base and will build on this success in all future removals.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $30K
Estimated Project Schedule: 2006-2011

Resource Area: Wetland Protection
Objective: Continue the wetland restoration and enhancement at the Coyote Springs wetland complex.
Applicable Primary Goal(s): 1, 2, 3, 6, 8, and 10
Project Description: The Coyote Springs Wetland Complex has undergone significant restoration and enhancement over the last 5 years. In an effort to continue this project, Kirtland AFB will continue the restoration and enhancement effort by augmenting the vegetation in the area with seeding, planting, and monitoring programs at the wetland.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $25K
Estimated Project Schedule: 2006-2011

Resource Area: Wetland Protection
Objective: Complete an update of the wetland delineation for Kirtland AFB to reflect current conditions.
Applicable Primary Goal(s): 1, 2, 3, 6, 8, and 10
Project Description: The wetland delineation report for Kirtland AFB does not reflect current conditions as a result of the restoration and enhancement efforts conducted at the Coyote Springs Wetland Complex and a recently discover wetland located south of Coyote Springs Road. Therefore an updated wetland delineation for Kirtland AFB is needed. The wetland delineation report will follow the 1987 USACE procedures for classifying wetlands.
Priority: 1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $30K
Estimated Project Schedule: 2006

Resource Area: Wetland Protection
Objective: Identify the function and values, as well as inventorying the flora and fauna of the bases wetlands.
Applicable Primary Goal(s): 1, 2, 3, 4, 6, and 10
Project Description: Changes to the wetlands on base have changed the function and values of the wetlands on base as well as the flora and fauna inhabiting them. As a result, an inventory of the present flora and fauna of the bases wetlands and the function and values will be evaluated and described.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost: $30K
Estimated Project Schedule:2006

Resource Area: Wetland Protection
Objective: Monitor flora and fauna at the Coyote Springs Wetland Complex
Applicable Primary Goal(s): 1, 2, 3, 6, and 10
Project Description: The Coyote Springs Wetland Complex has undergone significant habitat restoration and enhancement. In order to determine the success of this project, the wetland should have its flora (hydric and xeric) and fauna (mammals, birds, reptiles, amphibians, and invertebrates) inventoried and then monitored annually to identify changes resulting from the restoration/enhancement effort. Monitoring should also note what, if any, changes or management should be done to further enhance diversity at the wetland.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost: $40K annually
Estimated Project Schedule: 2006-2011

Resource Area: Grounds Maintenance and Land Management
Objective: Develop and implement a Golf Course Management Plan.
Applicable Primary Goal(s): 1, 7, 8, 9, and 10
Project Description: Develop and implement a Golf Course Management Plan that focuses conservation of water, pest management, weed control, grounds maintenance, and minimal use of pesticides and herbicides.
Priority:1
Office of Primary Responsibility: Base Parks and Recreation
Estimated Cost: No Cost (done in house)
Estimated Project Schedule:2006

Resource Area: Grounds Maintenance and Land Management
Objective: Review and update, if conditions change, the Revegetation Action Plan.
Applicable Primary Goal(s):1, 2, 3, and 9
Project Description: Review the 2004 Revegetation Action Plan. If conditions on base have changed significantly, then an update of the plan shall be completed.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost:$15K
Estimated Project Schedule: 2009

Resource Area: Grounds Maintenance and Land Management
Objective: Review and update, if conditions change, the Land Management Plan.
Applicable Primary Goal(s): 1, 2, 3, and 9
Project Description: Review the 2004 Land Management Plan. If conditions on base have changed significantly, then an update of the plan shall be completed. This plan shall include land management procedures that maintain burrowing owl habitat.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost:$55K
Estimated Project Schedule:2009

Resource Area: Grounds Maintenance and Land Management
Objective: Develop a long-term photographic monitoring program that documents changes in landscape and vegetation on base.
Applicable Primary Goal(s):1, 2, 3, 8, and 9
Project Description: Long-term changes to the vegetation and landscape at Kirtland AFB have not taken place. In order to understand long-term changes to the land at Kirtland AFB a photographic monitoring program will be developed and implemented. Photographic monitoring will involve the establishment of photographic points in strategic locations (i.e. golf course, firing ranges, erodable areas, ect) that will be revisited on a predetermined basis (i.e. annually, every 5 years, or whatever the program decides). Review of the photographs over a period of years will provide a record of landscape and vegetation changes occurring on base from military operations and management.
Priority:1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost:$35k
Estimated Project Schedule: 2007

Resource Area: Grounds Maintenance and Land Management
Objective: Review and update, if conditions change, the Brush Control Plan.
Applicable Primary Goal(s): 1, 2, 3, and 9
Project Description: Review the 2004 Brush Control Plan. If conditions or goals on base have changed significantly, then an update of the plan shall be completed.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost:$55k
Estimated Project Schedule:2011

Resource Area: Grounds Maintenance and Land Management
Objective: Update the bases natural resources inventory, which delineates vegetation communities, identifies areas of erosion, and identifies areas in need of revegetation, noxious weed invasions, and vegetation reconnaissance points. Integrate this information into other various management programs.
Applicable Primary Goal(s):1, 2, 3, 4, 7, 8, and 9
Project Description: Survey the base for areas of erosion, revegetation, invasive weeds, vegetation reconnaissance points, and delineate vegetation communities. Compare these survey results with Kirtland AFBs 2001 Baseline Natural Resources Inventory to identify areas that have improved, are still in need of improvement, or new problem areas. A small mammal survey should also be conducted as part of this task.
Priority:1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $50K
Estimated Project Schedule: 2010

Resource Area: Grounds Maintenance and Land Management
Objective: Develop and implement a Land Condition Trend Analysis (LCTA) program for Kirtland AFB.
Applicable Primary Goal(s):1, 2, 3, 4 and 8
Project Description: Develop a Land Condition Trend Analysis plan that outlines a program for inventorying, monitoring, and evaluating natural resources on Kirtland AFB. Using the LCTA natural resource managers will be able to collect, store, retrieve, and analyze data related to topographic features, soil characteristics, climate variables, vegetation, and wildlife. Development of this plan will require assistance and input from the Center for Ecological Management of Military Lands at Colorado State University. Information will need to be imputed into a user friendly database such as Microsoft Access. Once a LCTA plan has been developed for Kirtland AFB, it shall be implemented on an annual basis.
Priority:1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: $25k for the plan. Cost for annual monitoring will be dependent upon the scope identified in the plan.
Estimated Project Schedule: 2007-2011

Resource Area: Forest Management
Objective: Continue working with the Sandia Ranger district in joint management of forests in the Withdrawal Area.
Applicable Primary Goal(s):1, 2, 3, 4, 6, 7, 8, 9, and 10
Project Description: Continue working with the Sandia Ranger district in joint management of forests in the Withdrawal Area.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost: No Cost
Estimated Project Schedule: Immediate and ongoing

Resource Area: Wildland Fire Management
Objective: Finalize and implement the Wildland Fire Management Plan.
Applicable Primary Goal(s):1, 2, 3, 7, 8, 9, and 10
Project Description: Finalize and implement Kirtland AFBs Draft Wildland Fire Management Plan.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost: No Cost (Completed in House)
Estimated Project Schedule: 2006

Resource Area: Integrated Pest Management Program
Objective: Continue to manage prairie dog populations on base to minimize BASH potential, damage to infrastructure, and health and safety concerns by following the procedures outlined in Kirtland AFBs Prairie Dog Management and Relocation Plan.
Applicable Primary Goal(s):1, 2, 5, and 7
Project Description: Continue to manage prairie dog populations on base to minimize BASH potential, damage to infrastructure, and health and safety concerns by following the procedures outlined in Kirtland AFBs Prairie Dog Management and Relocation Plan.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost: No Cost (Completed in House)
Estimated Project Schedule: Immediate and Ongoing

Resource Area: Integrated Pest Management Program
Objective: Develop and implement a Pigeon Management Plan for aircraft hangers on base where pigeons are causing health concerns.
Applicable Primary Goal(s): 1, 2, 5, and 7
Project Description: Develop and implement a pigeon management plan for aircraft hangers on base where pigeons are causing health concerns. The management plan will focus on appropriate methods for eliminating pigeons from the hangers, as well as, methods that can be used to prevent pigeons from re-roosting in unwanted areas.
Priority:1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost:No Cost (To be completed in house)
Estimated Project Schedule: 2006

Resource Area: Integrated Pest Management Program
Objective: Survey for noxious weeds and develop a management plan.
Applicable Primary Goal(s): 1, 2, 3, 6, 7, 8, and 9
Project Description: Conduct a base wide survey of invasive weeds as identified by the New Mexico Department of Agriculture. Tamarisk, although not considered an invasive weed, will also be surveyed for and identified as a species requiring management. Once the survey is completed, a management plan will be developed to aid the base in eliminating or managing the invasive species that do occur on base.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost:$12k
Estimated Project Schedule: 2006

Resource Area: Bird/Aircraft Strike Hazard
Objective: Continue to monitor and remove prairie dogs around flight lines to reduce foraging raptors in the area.
Applicable Primary Goal(s): 1, 2, 5, and 7
Project Description: Continue to monitor and remove prairie dogs on an as needed basis around flight lines to reduce the potential for foraging raptors in the area.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost: No Cost (To be completed in house)
Estimated Project Schedule: Immediate and Ongoing

Resource Area: Bird/Aircraft Strike Hazard
Objective: Maintain the mowing program around flight lines in order to reduce attracting prey species for raptors and other wildlife.
Applicable Primary Goal(s): 1, 2, 5, and 7
Project Description: Maintain the mowing program around flight lines in order to reduce attracting prey species for raptors and other wildlife.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost: No Cost (To be completed in house)
Estimated Project Schedule: Immediate and ongoing

Resource Area: Outdoor Recreation
Objective: Implement a program on base that educates personnel where recreation activities such as horseback riding, mountain biking, and running are allowed, to prevent conflicts with military missions and incidents with UXO.
Applicable Primary Goal(s):1, 6, 8, and 10
Project Description: Develop a map of the base that shows which areas of the base may be used for recreational activities such as horseback riding, mountain biking, and running. Distribute these maps at appropriate locations and recreational facilities such as the equestrian center, gymnasium, and recreational center.
Priority:2
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost: No Cost (To be completed in house)
Estimated Project Schedule: 2008

Resource Area: Cultural Resources Protection
Objective: Maintain communication between cultural and natural resource personnel to ensure protection of cultural resources discovered during INRMP implementation.
Applicable Primary Goal(s):1 and 9
Project Description: Maintain communication between cultural and natural resource personnel to ensure protection of cultural resources discovered during INRMP implementation.
Priority:1
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost: No Cost
Estimated Project Schedule: Immediate and ongoing

Resource Area: Enforcement
Objective: Ensure that Kirtland AFB security personnel, DOE security personnel, and the NMDG&F work together when poaching of deer occur on base.
Applicable Primary Goal(s):1 and 2
Project Description: Ensure that Kirtland AFB security personnel, DOE security personnel, and the NMDG&F work together when poaching of deer or collisions with wildlife occur on base.
Priority:1
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: No Cost
Estimated Project Schedule: Immediate and ongoing

Resource Area: Enforcement
Objective: Continue to patrol the Withdrawal Area for trespassers.
Applicable Primary Goal(s): 1 and 2
Project Description: Continue to patrol the eastern boundary of the Withdrawal Area for trespassers in order to prevent conflicts with the military mission and public exposure to UXO.
Priority: 1
Office of Primary Responsibility: 377 SFS
Estimated Cost: No Cost
Estimated Project Schedule: Immediate and Ongoing

Resource Area: Enforcement
Objective: Ensure that new security personnel are aware that unauthorized feeding of wildlife is prohibited on base.
Applicable Primary Goal(s):1, 2, 5, and 7
Project Description: Base employees frequently feed wildlife on base, especially prairie dogs. Feeding of wildlife can conflict with the bases natural resources management objectives such as BASH and Human Health and Safety issues. Current security personnel are aware that feeding of wildlife on base is prohibited. However, no program is in place to ensure that new or future security personnel are aware of this issue. Natural resources personnel at Kirtland AFB shall coordinate with current security personnel to ensure new personnel are aware that unauthorized feeding of wildlife is prohibited.
Priority:2
Office of Primary Responsibility: 377th MSG/CEVQ
Estimated Cost: No Cost
Estimated Project Schedule: Immediate and ongoing

Resource Area: Public Outreach
Objective: Prevent spread of prairie dog colonies off Kirtland AFB.
Applicable Primary Goal(s): 1, 2, 6, and 7
Project Description: Continue following Kirtland AFBs Prairie Dog Management Program to prevent prairie dog colonies from expanding off base.
Priority:1
Office of Primary Responsibility: 377th MSG/EVQ
Estimated Cost: No Cost
Estimated Project Schedule: Immediate and ongoing

Resource Area: Public Outreach
Objective: Organize conservation projects with non-profit organizations and develop a program educating base personnel and the public about the importance of wetlands and other wildlife species.
Applicable Primary Goal(s):1, 2, 3, 6, and 10
Project Description: Organize conservation project with non-profit organizations such as Scout Troops and Youth Conservation Corps. Develop a program for the Coyote Springs Wetland Complex that educates the public and base personnel about the importance and value of wetlands and other education programs that identify the importance of ecosystem management.
Priority:2
Office of Primary Responsibility:377th MSG/CEVQ
Estimated Cost: $5K
Estimated Project Schedule:2006-2011

APPENDIX B
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN ENVIRONMENTAL ASSESSMENT

APPENDIX C
KIRTLAND AIR FORCE BASE MANAGEMENT PLANS AND SURVEY REPORTS

The following Natural Resources Management Plans and Reports are on file and available at Kirtland AFB.

- Kirtland AFB Bird Aircraft Strike Hazard Plan 92-212, April 2004.
- Environmental Assessment for Kirtland AFB Prairie Dog Management Program, November 2003.
- Kirtland AFB Wetland Inventory Survey, 1995.
- Final Surveying Report for Mountain Plover and Gray Vireo Populations at Kirtland AFB, August 2005.
- Updated Report of Vegetation at Kirtland AFB, March 2004.
- Final Revegetation Action Plan for Kirtland AFB, September 2004.
- Kirtland AFB Wildland Fire Management Plan, December 2005.
- Final Surveying Report for Mountain Plover and Gray vireo Populations at Kirtland AFB, February 2004.
- Work Plan for Surveying Mountain Plover and Gray Vireo Populations at Kirtland AFB, October 2002.
- Final Road Closure and Maintenance Plan for Kirtland AFB, June 2004.
- Final Brush Control Plan for Kirtland AFB, July 2004.
- Rare Amphibian and Reptile Survey Report for Kirtland AFB, February 2004.
- Final Integrated Natural Resources Management Plan for Kirtland AFB, September 2001.
- Kirtland AFB Coyote Springs Wetland Restoration Project, January 2006.
- Kirtland AFB Wetland Delineation Report, March 2001.
- Kirtland AFB Base Wide Raptor Survey, October 2003 – November 2004.
- Five year Report on the Population Status, Reproductive Success, and Site Fidelity of Western Burrowing Owls (*Athene cunicularia hypugaea*) on Kirtland AFB, 1998 – 2003.
- Population Status, Reproductive Success, Prey Delivery, and Site Fidelity of Western Burrowing Owls (*Athene cunicularia hypugaea*) on Kirtland AFB, 2004.
- Population Status, Reproductive Success, Prey Delivery, and Site Fidelity of Western Burrowing Owls (Athene cunicularia hypugaea) on Kirtland AFB, 2005.
- Kirtland AFB Hazardous Waste Management Plan, December 2004.
- Kirtland AFB Pest Management Plan, 2004.
- Kirtland AFB Land Management Plan, 2004.

APPENDIX D
SOIL DESCRIPTIONS FOR KIRTLAND AIR FORCE BASE

APPENDIX E
FLORA LIST FOR KIRTLAND AIR FORCE BASE

APPENDIX F
FAUNA LIST FOR KIRTLAND AIR FORCE BASE

APPENDIX G
SPECIES OF CONCERN FOR BERNALILLO COUNTY

APPENDIX H
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN ANNUAL REVIEW AND AGENCY CORRESPONDENCE LETTERS